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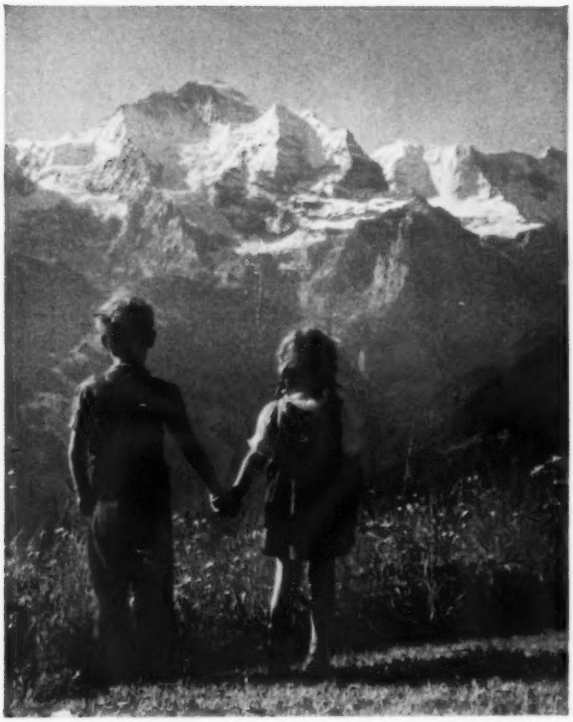
Light and Lighting

August 1960

Fountains Abbey, floodlit in May for the IES Summer Meeting. The scheme was carried out in a co-operative venture as a unique installation displaying how the contrasting qualities of tungsten and fluorescent lighting can be combined with dramatic effect. (See pages 216-221)



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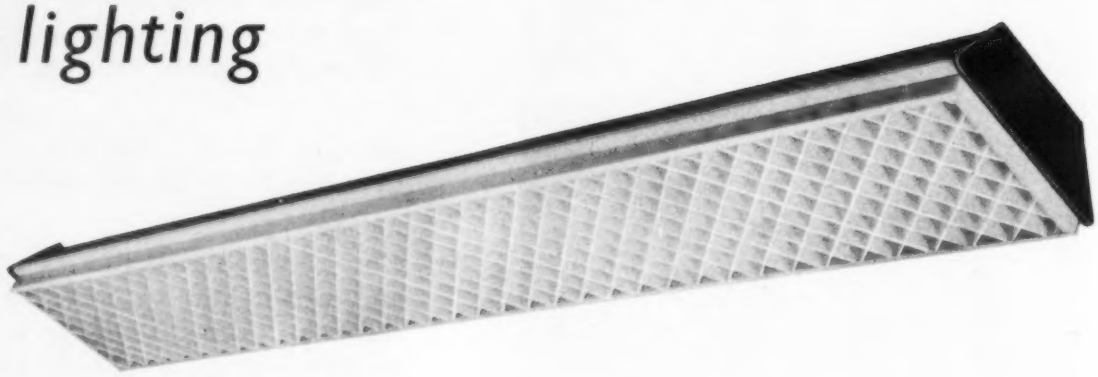
Service by Air, BEA Viscount (Photo Courtesy BEA)

plastic components in lighting



1 Complete light diffuser fabricated from moulded and extruded plastics. Produced from A.E.I. Lamp & Lighting.

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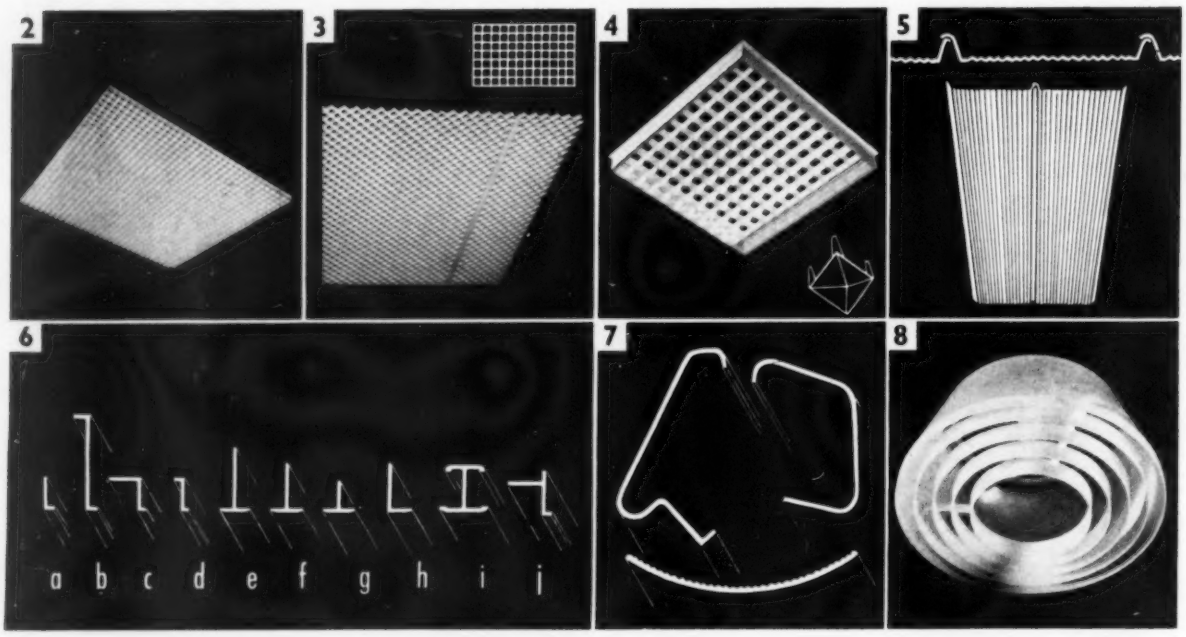
6 Plastic supporting sections: (a) 1" x $\frac{1}{2}$" Angle, (b) 3" 'Z' Edging, (c) 1" 'Z' Edging, (d) 1" x 1" 'Z' Edging, (e) 2" Tee Bar, (f) $1\frac{1}{2}$" Tee Bar, (g) 1" Tee Bar, (h) $1\frac{1}{2}$" Angle, (i) $1\frac{1}{16}$" 'H' Section, (j) 1" x $1\frac{5}{32}$" special 'Z' Edging.

7 Typical sections of plastic extruded diffusers, as supplied to lighting fitting manufacturers.

8 Moulded plastic shade and louvre as produced to the design of Messrs Hume Atkins & Co. Ltd. (Registered Design No. 880153).



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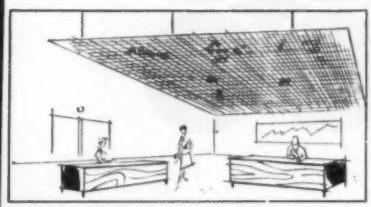

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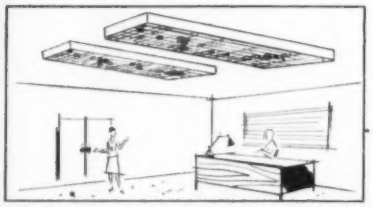

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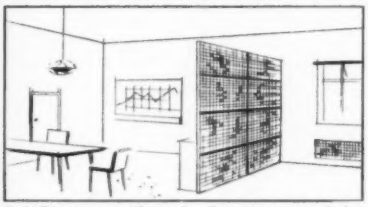

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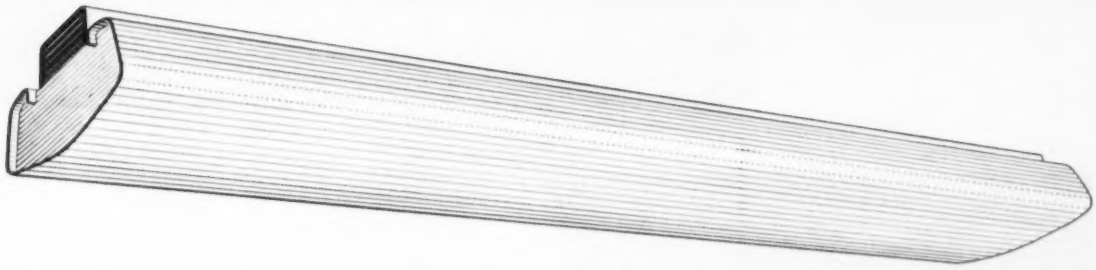
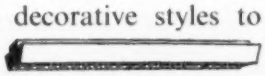


Perhaps because light bills show red on the balance sheet, businessmen tend to view lighting as 'loss'. Yet today Atlas makes it an asset, a *positive* factor,  a means of saving both time and money. Look at **atlas atlantic.** Here, with only one standard chassis, you can plan a complete lighting installation, *with the right kind of light for every department.* One basic unit, endless variations. One basic unit, low-cost installation. One basic unit, high-speed maintenance.  And the features of **atlas atlantic** are in many respects unique . . . as one would expect of Britain's finest range of pre-assembled, multi-use fluorescent fittings. Sizes available are 8 ft., 5 ft. and 4 ft., with single or double tubes. The range of interchangeable diffusers and reflectors provides the widest possible choice of fittings, from superb decorative styles to production line trunking. 

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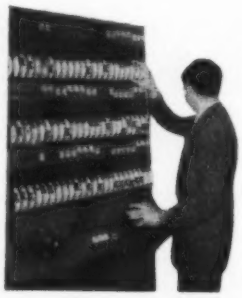

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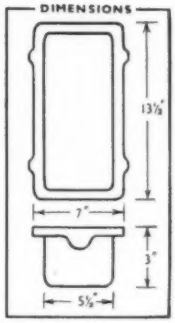

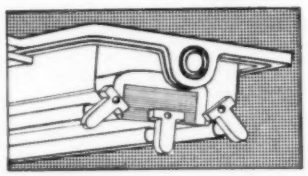

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Light and Lighting

Vol. 53 No. 5

CONTENTS

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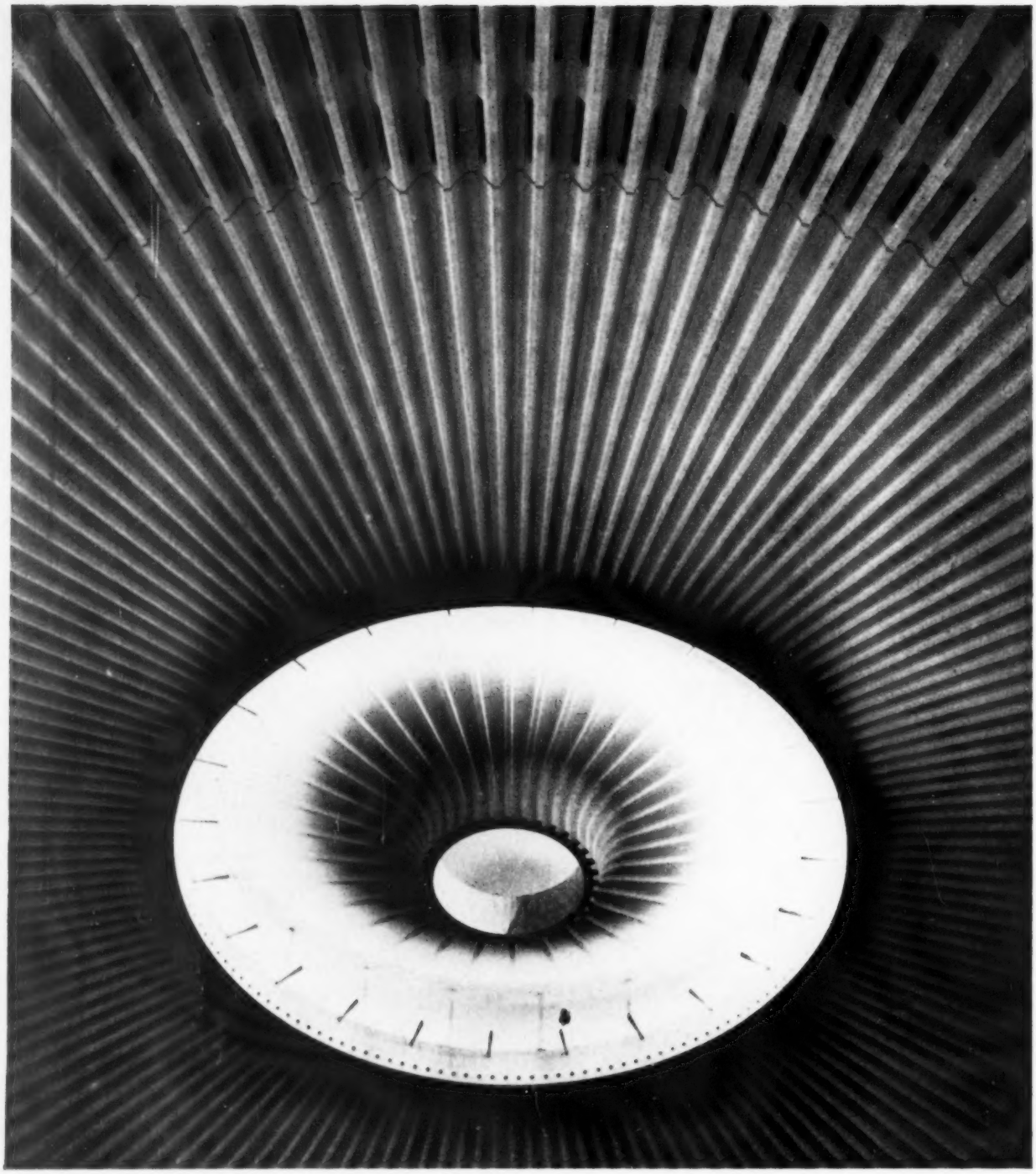
Co-operation in Lighting

OFTEN ENOUGH the importance of co-operation between lighting engineers and architects in particular has been asserted if the best lighting of buildings is to be achieved. Hardly ever, however, is the importance of co-operation of the user with the lighting engineer stressed. Is this because such co-operation is taken for granted and, if so, is it always forthcoming in proper measure? The lighting engineer is quite rightly expected to have 'know-how' in carrying out his function, but it is another matter to have 'know-what' and it is in this respect that he is entitled to look for co-operation from the user. Some of the discrimination tasks for which lighting is required are so specialized, and so dependent upon visual skill which cannot be quickly acquired, that what is likely to be the most effective lighting simply cannot be judged by the lighting engineer who is shown the job once. The user, who is adept at his particular task, is in the best position to analyse it, but often does not do so or cannot communicate to the lighting engineer exactly what it is he needs to see. Such cases have to be dealt with experimentally until the best solution is found. But, if work-study departments paid as much attention to ascertaining and describing the visual aspects as they do to the manual and machine aspects of jobs, they ought to be able to give the lighting engineer information of great assistance to him in preparing lighting designs.



Central portion of shallow dome of the Sports Palace at Rome designed for the 1960 Olympic Games by Pier Nervi. The skylight incorporates high-wattage projectors focused on the arena below, thus dispensing with the need for normal suspended lighting fittings.

The impact of contemporary ideas of aesthetic design has been felt throughout the whole field of lighting; not merely by influencing the outward form of lighting equipment which forms part of the visual scene but also in stimulating the development of equipment for lighting the scene without obtruding on it. Both features of this impact are considered in the following symposium. It relates changes in design during the last decade to an evolution towards a comprehensive study of all human requirements, pointing ultimately to a basis for design almost wholly logical, in place of what was largely intuitive, to satisfy both functional and aesthetic needs. These two attributes of design are further analysed to indicate, on the one hand, their essential interdependence for components forming part of the visual scene and, on the other, the way they have been made mutually exclusive to facilitate design of the visual scene as a whole. The symposium has the authority of three authors well qualified in their respective spheres: Mr Coleman is a free-lance writer previously with 'Design', Mr Barnicot is chief industrial designer for a lighting fittings firm and Mr Phillips is well known to 'Light and Lighting' readers as an architect and lighting consultant.

DESIGN symposium

PART ONE: LIGHTING FITTINGS IN RELATION TO GENERAL TRENDS IN INDUSTRIAL DESIGN: BY R. COLEMAN

THE role that artificial lighting plays in the design of environments is twofold. On the one hand, it enables the function of the environment to be carried on when there is no natural light. On the other hand, it forms part of the total visual character of the environment—in a living room, for example, it becomes part of the decoration. Interior design—i.e. the design of certain kinds of environment—is, in effect, the combination of various kinds of design and, as such, is dependent largely on the character of those designs. Consequently, the dominant trends at any one time in, for example, product design will affect the trend in interior design.

Since the 'Arts and Crafts' movement at the end of the last century, design has been governed by rules and principles that have had a profound effect on the appearance of products—sometimes because of the rules, sometimes in spite of them. However, all trends in industrial design are concerned with a relationship between factors of appearance (aesthetics or style) and factors of function (performance and use). This applies to lighting, to furniture, to domestic appliances, to office equipment, to fabrics and to interior design. Hence, rather than discuss the ways in which lighting design relates to the design of other products in a one-to-one sense, I want to show how all design at any one time manifests certain common ideas and forms and, further, to demonstrate some of the relationships between these ideas and the forms themselves.

According to accepted industrial design theory it should not be possible to discuss the appearance of a product without at the same time discussing how it was made, the materials it was made from, its function and so on. Similarly, the evaluation of a product should be made on more than just its looks. Unfortunately, there seems to be very little agreement on precisely the balance that needs to be struck between looks and performance, though there is an increasing tendency to weight judgment in favour of the degree to which a product meets the user's requirements rather than the degree to which it looks attractive. There is logic in this if only because user requirements are, on the surface at least, easier to assess than appearance. But, in the last analysis, even appearance is part of the user's requirements and the ratio of strictly 'appearance factors' and strictly 'use factors' depends on the nature of the product in question. For example, there was a time when the criterion for kitchen equipment—cookers, saucepans, etc.—was predominantly one of use, but changing social and

1. Spherical lighting fitting made by Troughton & Young to a design developed in the mid-1920s, and
2. A tubular-steel chair designed by Mies van der Rohe in 1926. These two designs have a remarkable similarity—simple shapes, absence of embellishment and straightforward use of materials. Both are the result of an almost moral adherence to the idea that form follows function, and that a design which functions well inevitably looks well.
3. Resting chair designed in 1950 by Ernest Race, and
4. Pendant lighting, fitting designed in 1952 by John Reid. In their own but quite different way these two products show the same close relationship as the two products of the 1920s, but instead of the 'functional' aesthetic they represent the aesthetic of British design in the early 1950s—lightness, mobility and space defined by rods and holes rather than displaced by mass.

1	2
3	4

cultural habits have made it necessary for appearance to play almost as large a part as it does with, say, furniture or fabrics.

Moreover, when people buy a product they are, in effect, buying its appearance and those qualities its appearance leads them to believe it possesses. There seems to be a belief among designers and people interested in good design that consumers act rationally when they buy good design but irrationally when they buy bad design. The truth is that they probably act both rationally and irrationally when they buy either. Consumers do not exist in a cultural vacuum and a lighting fitting with lamps the shape of flames, with plastic tallow running from them, may meet one user's requirements, just as a well-designed modern fitting may meet another's. I mention this because of the importance that is attached to the idea of function in design and to show one of the difficulties involved in evaluating it.

Theory of design

All products that can be described as being 'industrially designed' are related, to some extent, by the generally understood theory of design. This theory, very briefly, demands that the appearance of a product should evolve from a consideration of its function, the requirements of its users, the materials from which it is made, and the methods of its production. As a slogan, one sums this up by saying 'form follows function'. The real purpose of design theory is to prevent an arbitrary form from being applied as a surface dressing, and its implication is that any product which functions efficiently will look well. In practice, however, the package is not quite so neatly wrapped. The 'correct' appearance does not follow automatically from a consideration of production and use, etc. At present there is simply not sufficient information for this to be possible, and it follows that there will be a considerable area in which the designer is faced with a choice between several equally suitable possibilities. It is this area that enables design to retain its traditional definition as an aesthetic activity; allows fashions in appearance a certain independence from functional considerations; and permits the passage of an aesthetic from one industry to another. In other words, it allows us to discuss trends in the appearance of lighting, furniture, cookers, radios and so on in practically the same breath.

Of course, if form really did follow function and there was no zone of free choice one would still find products from different industries embodying similar visual characteristics: technical developments that can affect the appearance of a product in one industry are very often paralleled by developments in another. For instance, the concept of prefabrication exists in the lighting, furniture and domestic appliance industries, as well as in the building industry. Also, the introduction of new materials and more sophisticated processes of manufacture has a substantial effect on the nature of design. Another factor that has a strong influence on the appearance of products is *sales*. A manufacturer producing a particular range of lighting fittings cannot afford to be too far out of step with the current image of design which his potential customer accepts in other products.

Festival of Britain

If industrial design is to function successfully it needs a public capable of supporting it, an industry capable of using it and a body of designers capable of producing it. During the 1950s industry began to show signs of its growing awareness of the role that the designer can play, while the public demand for industrially designed goods has grown appreciably since, say, the Festival of Britain. The Council of Industrial Design has, of course, played a big part in guiding consumers along what it believes are the right lines and the image of modern design has been popularized in numerous magazines and newspapers. But perhaps the most important factor in this context has been the development of the practice of design into a highly organized international profession.

In the ten years that have passed since the Festival of Britain the image of industrial design has changed a great deal. In general terms it has become surer of itself, less parochial, saner and more realistic—all signs of professionalism. Just how it has

Pendant lighting fitting (near right) designed in 1955 by John Reid and group of fittings (far right) designed in 1959 by Richard Stevens. The former shows a development away from the 'gimmickry' of the early 1950s towards a saner, more rational form; the latter expresses well the look of the late 1950s, its keynotes being simplicity, precision and richness of treatment.

DESIGN symposium

developed can be seen by comparing designs of the early '50s with those of the late '50s.

The South Bank exhibition was, in many ways, the celebration of the designer. The particular look that is inseparably associated with it—rods, spaces, holes and mobiles—was influenced by several otherwise unrelated factors. These included a reaction to immediately post-war austerity, a reaction to the inflexible principles of functionalism, the commemoration of the 1851 exhibition (which after all was a showroom of Britain's pioneering industrial achievements), and the acceptance of an architectural design aesthetic such as that recommended by Siegfreid Geideon, with his Einsteinian conception of mobility, floating forms and interpenetrating spaces. While the designers of the early '50s accepted the broad principles of a functional design theory, they tried in their practice to do something at once less austere, less 'functional' looking and, incidently, more specifically national in character. 'Festival' design, like that which went before it, was essentially an aesthetic activity: the austerity of design in the '20s was not an index of functional efficiency, it —too—was an aesthetic statement. In spite of the insistance on function in modern design theory, it has been, and basically still is, a theory of *form*, aimed at guiding the *artist*.

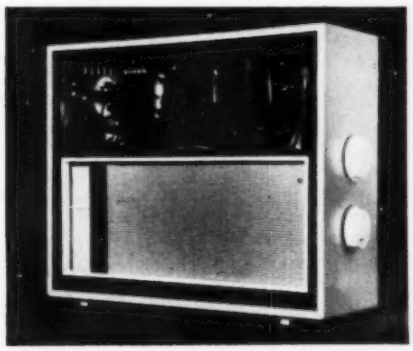
A new 'humanism'

However, since the early '50s design has been developing gradually towards a more realistic study of human requirements, not only on the physical level but on the psychological level as well. It is this awakening interest in *human beings* that has made possible significant contributions to the appearance of things in the last few years. In addition to the influence of human usage, and in some ways related to it, there has been the influence of technology. In spite of the Bauhaus concern with machine methods of production, Bauhaus ideas were based on a craft ideology. Indeed, if one of the principal aims of industrial design has been to find an aesthetic in keeping with machine production, the designers of the '50s might fairly lay claim to have found this aesthetic for the first time.

In its most sophisticated form, design for human requirements involves a completely new conception of the design process and completely new definitions of the designer and his skills. At the moment such rationally-based researches as ergonomics

1 | 2 | 3

1. Chair of glass-fibre-reinforced resin designed by Charles Eames. One of the key images of mature design of the 1960s, it combines the two outstanding characteristics of recent design—the beginnings of adaption to human requirements (note the shape of the seat) and a technological elegance in structure and finish. 2. Prototype radio set designed in 1958 by a second year student at the LCC Central School of Arts and Crafts, and 3. A 'Frigidaire' electric cooker. Both provide clear examples of the influence of technology on the 'styling' of domestic products.



Television receiver on castors designed at the Hochschule für Gestaltung, Ulm, Germany. While this design does not look surprisingly different from most sophisticated designs of the 1950s, the ideology behind it is radically new. The teaching at Ulm suggests a new definition of design, in terms of logical methods that can be applied to anything from a single lighting fitting to a whole environment.

or human engineering, as they are called in the United States, are being adapted to intuitive and aesthetic methods of design. But at the Hochschule für Gestaltung at Ulm, Germany, which was inaugurated in 1955, design is being taught as a logical process, with reference to such studies as information theory, semantics, operations research, topology, sociology and so on. These 'logical design methods', as John Christopher Jones has described them, are still largely a matter of theory, and even at Ulm they have not yet produced a product the design of which embodies all the principles involved. Nevertheless, this new approach to design is clearly the most important single trend to have developed during the last ten years or, possibly, since the Bauhaus itself.

Epoch making

Industrial design today, in terms of actual products, is somewhere between logic and intuition. Most good designs combine a sophistication of form based on an acceptance of technology and its processes with a scale that suggests a concern for the adaption of products to their human users. One design that shows this combination clearer than almost any other produced during the '50s is Charles Eames's moulded glass-fibre chair, once described by Reyner Banham as 'epoch-making'. It was designed before the Festival of Britain but the epoch it has made, certainly in this country, dates only from the mid-1950s.

It may be significant that one of the most influential books of the '50s—Nobert Wiener's *The Human Use of Human Beings*—deals with the same two factors that have, during this period, affected design so radically—technology and human requirements. At the end of the next ten years we may be in a position to judge the first achievements resulting from the new ideas developing at Ulm, though this possibility depends not only on designers but also on the industrialists who employ and commission their work.

DESIGN symposium: part two

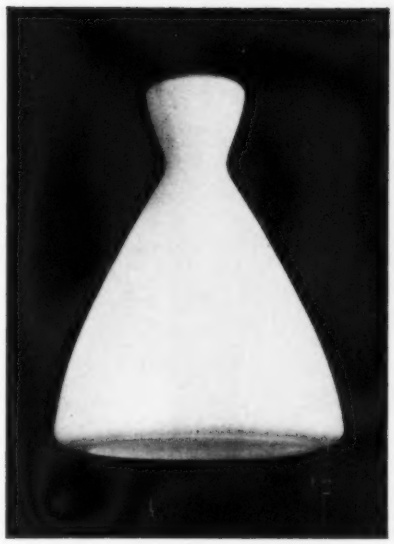
THE SEPARATION OF FUNCTIONAL AND DECORATIVE ASPECTS OF ARCHITECTURAL LIGHTING SCHEMES

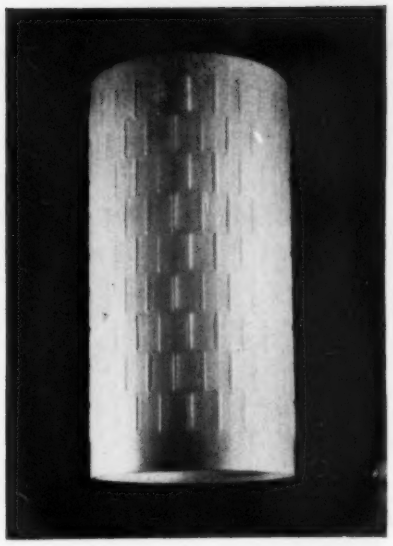
By J. M. Barnicot

THE meaning of the word 'function' is clear to most people. It implies that some action is being performed, and the Oxford Dictionary says that it is 'the work that a thing is designed to do'. It must, therefore, be something considered and 'built into' a product during the design process, and, while the form that the product takes will depend on a number of factors, it will depend mainly on the amount and the type of work that it is required to do, together with the materials and production processes to be used in making it.

Generally, it would seem that within the limits of technique, materials and production, the more efficiently a product is to do its particular kind of work the more limited and defined does its form become. Fresh knowledge, new viewpoints or economic needs; new materials; a new productive process; or an alteration in the amount or type of work will lead to new form. This is truly a part of the natural process of evolution. It has nothing to do with fashion, gimmicks or plain muddled thinking—all of which can also produce variations in form, though the results of these influences are shallow, transient or downright silly designs.

For a thing to be 'functional' then, implies that it has a purposeful quality built into it. 'Decoration' on the other hand—if





Different materials lend themselves to different decorative treatments. With the satin-opal glass diffuser seen in Fig. 1 (near right) emphasis is on line and texture; with the glassware seen in Fig. 2 (far right) advantage has been taken of the manufacturing process to form a surface pattern.

we consider the usual meaning of the word —acts in a different way. Reference to the Oxford Dictionary, again, tells us that 'to decorate' is to 'make beautifying additions to' or 'to be such an addition to'. Clearly, then, according to these definitions, while function must be a part of the conception of a thing, decoration is added later. In this sense there is separation between these two aspects of design.

During the nineteenth century and during the first quarter of the present century, the process of 'beautifying' by addition was the commonly accepted approach to the creation of things. As we know, even machines were given this treatment, appearing with curious floral and geometric decoration on them so that their nakedness might appear more respectable. Gas-lighting and, later, electric-lighting fittings, masqueraded for many years in very strange garments. Happily, however, a new aesthetic viewpoint has led to a new approach to design, accepting that beauty is not something one can *apply* to anything. Like the word 'decorative', beauty is an awkward word, capable of many shades of meaning, but true beauty is as much *a part of a thing* as is its function. Consider, for example, a modern aircraft, whose form is purely related to its function. It cannot be said to be decorative, but it can be beautiful and why we say it is beautiful is not easily explainable, for it is the result of many factors.

Aesthetic . . . .

The word concerned with sensory perception and used properly to describe our sense of beauty is 'aesthetic'. Certain forms —relationships of mass and of space, scale, light and shade, pattern, line, colour, texture, contrast and proportion—by themselves or related to others, are capable of stimulating our aesthetic sense. Conversely, some forms have qualities or can be related to each other in ways that cause aesthetic *discomfort*.

When we describe a thing as decorative, we may mean various different things because this word can be used so loosely. We may mean 'applied beauty', like the chromium plating and misplaced colour so frequently found on otherwise satisfactory motor-car bodies; we may be using the word to describe such effects as the texture and grain of woodwork; or we may even use it—as a term of abuse—to imply an aesthetic asset which is simultaneously a functional liability.

. . . . pleasure

In whatever way we describe the results of their work, it is the business of designers not only to evolve the function and the form of things, but to do so in such a way that those elements of design that are capable of stimulating our aesthetic senses do, in fact, give us pleasure. In doing this, it may be that they will place more emphasis on one factor than on another. This may be because the materials used lend themselves to more emphasis on line and texture than on colour, as might be the case with a modern satin-opal lighting glass of the type shown in Fig. 1. On the other hand, the technique used to produce the glassware seen in Fig. 2 is different, and advantage can be taken of the opportunity to use patterns formed during manufacture. The form here is kept simple and the pattern helps to emphasize it. In both cases the aim has been to give a reasonable level of general light output.

The fitting shown on page 205 (top right) uses glassware which, with the lamp in its conventional position, would not take advantage of the particular characteristics it has as a lighting medium, for it is thick and clear and has small bubbles in it. It has a satisfactory feeling of once having been a molten mass and its fine qualities can best be shown by edge lighting. The design accepts the fact that the light-output ratio will be low, for in this instance the lighting fitting is intended to function as an example of luminous decoration and its form and materials are planned accordingly.

An earlier example of a fitting whose function was to be a luminous motif is shown in Fig. 3. In this instance form, colour, an interesting composition and contrasts in both brightness and materials, are given more emphasis than sheer light output. The fitting is designed to provide a local visual accent in an interior where other lighting exists.

There are several factors that have modified our view of the purpose of certain lighting fittings. It has always been the function of good lighting to provide comfortable seeing conditions for whatever the visual task may be, and it is indeed fortunate that as the demand for higher illumination values has grown, so too has our means of providing them. The fluorescent lamp, the reflector lamp, and more compact forms of general-service lamps, have assisted greatly in the development of lighting fittings combining a high light-output ratio with adequate means of brightness control.

Integrated lighting

Modern building techniques have enabled lighting equipment to be integrated with the structure of the building and the growing use of suspended ceilings has given architects and lighting engineers opportunities to use light in ways that were denied earlier generations. A high degree of flexibility, enabling the lighting to express moods, and to provide contrast, emphasis or 'sparkle', is now possible, so that a

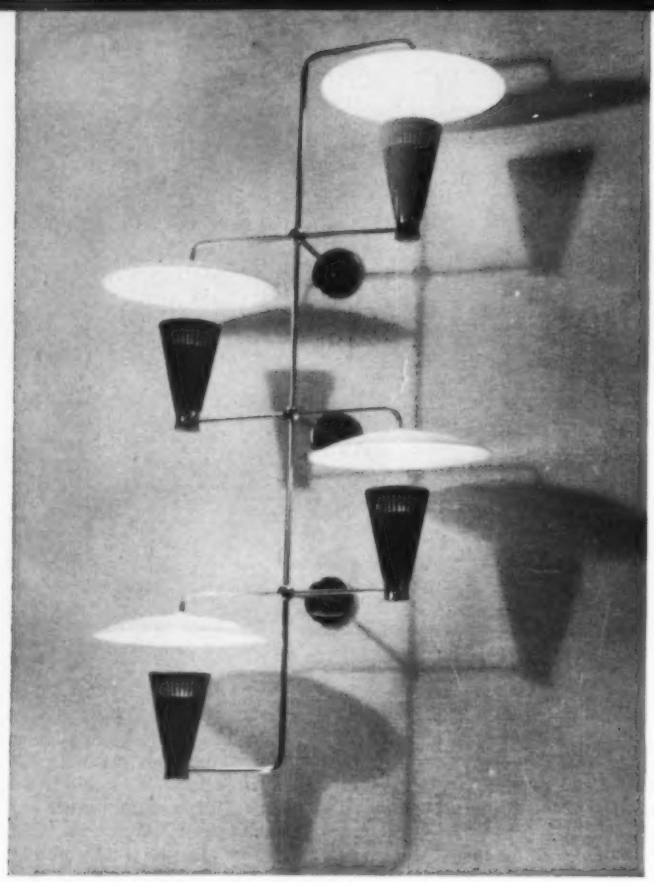


Fig. 3. Fitting designed to give visual accent in room where other lighting is provided.

complete installation can, by skilful design, stimulate our aesthetic sense, quite apart from any stimulation provided by the fittings themselves. Against such a background (and very much a part of it) certain lighting fittings of the types illustrated can be used locally with great effect, particularly where furniture groupings may require some form of visual emphasis. In this context, such fittings serve a *functional* purpose, though by themselves they may not give adequate and suitable light for seeing.

In most matters with which human beings have to deal, success depends on placing in the correct order of value various conflicting needs. In the design of things a similar evaluation must take place. Lighting installations and individual lighting fittings will, therefore, reflect the importance and meaning which the designer has given to the values of function and aesthetic impact. In some instances, lighting efficiency will be all-important; in others, both may deserve equal weight; while, in some circumstances, as we have seen, aesthetic values may take first place. It is frequently true, however, that a design that is functionally efficient has an intrinsic aesthetic appeal, without the intervention of any self-conscious 'styling' or the addition of any 'decoration'. With such designs, beauty and function are opposite sides of the same coin.

DESIGN symposium: part three

LIGHTING WITHOUT LIGHTING FITTINGS

By Derek Phillips, ARIBA

IT is one of the standard jokes of the lighting engineer that architects always attempt to light their buildings 'without lighting fittings', only adding them reluctantly to a predetermined solution at a stage in the design when the greatest difficulty will be experienced by the largest number of people. I think that there is more truth in this statement than is generally admitted by architects, though the reasons may lie deeper than those superficially assumed by the lighting engineer.

Lighting fittings, like windows, are of paramount visual interest in a space but, whereas the architect has control over the size and proportion of his windows, he can exercise only a *selective* responsibility for the lighting fittings. There are, of course, buildings for which the architect may have lighting fittings specially made but, in general, economy demands the use of standard fittings from the catalogue ranges of the equipment manufacturers.

It is significant that in the photographs that appear in the glossy architectural magazines, there is often no indication of the lighting method, unless the lighting fittings are intended to make an emphatic contribution to the *decoration* of the space, as in Fig. 1. This is due not to the difficulty of photographing lighting fittings, for which techniques are available. but to the almost subsconscious desire on the part of the architect to reject the intrusion of standard lighting fittings into the photographs of his work.

The desire to light buildings without lighting fittings supplied by manufacturers expressed itself in the '30s, during the growth of a new and vigorous modern architecture, by the introduction of 'indirect lighting methods'. The architect 'contracted out' of having to make any choice between the various lighting fittings then available, using, in effect, the whole room

as the fitting, the light sources being concealed behind structural members, pelmets and cornices. The latter, being elements of the fabric of the building, were things over which the architect had direct control, though the ultimate lighting effect was rather dead and uninteresting, as well as being inefficient. These results tended to bring what was known as 'architectural lighting' into disrepute.

Fittings defined

These facts, together with the need to provide higher illumination levels, have necessitated a reassessment of the whole problem of the use of standard fittings, and of lighting without 'lighting fittings'. What, in fact, do we mean by a lighting fitting? An American definition* reads as follows:

> 'A complete lighting unit consisting of a lamp or lamps together with the parts designed to distribute the light, to position and protect the lamps, and to connect the lamps to the power supply.'

This is a good definition, since it indicates, to some extent, both the advantages and disadvantages of the standard fittings. Thus, a fitting is a 'complete lighting unit'. This surely means that an electrical contractor can install it and wire it up with ease and electrical safety; it also implies that it must appear as a complete entity whether it is used singly or in large quantity—a difficult design problem, indeed! In the case of a fluorescent fitting it means also that the associated control gear must form a part of the design—again, a factor responsible for making fluorescent fittings heavy both in weight and appearance.

Next—a fitting will have 'the parts designed to distribute the light'—in the form, presumably, of reflectors or optics. This makes for efficiency, but at the same time, while the distribution from the fitting may be excellent for achieving high levels of illumination on a horizontal working plane, it may not always be in the right distribution for illuminating spaces as an architect visualizes them. Hence, standard fittings, while having the advantages that they are electrically safe, easy to install and efficient in operation, often suffer from being out of sympathy with the architecture, cumbersome in appearance and self-conscious in design.

Luminous ceilings

In the immediate post-war years, the problem of providing higher levels of illumination, together with the poor selection of fluorescent fittings then available (modelled on classical cornices and 'Coca Cola' machines), forced the discerning designer to think again in terms of lighting without fittings or suppressing the individual fittings in the interests of the overall design (as in the Bata shoe shop seen in Fig. 2). This was largely the basis for the

* American IES Handbook, 3rd Edition.

Fig. 1 (right) junior common room, Queen's Building, Exeter University (architects, William Holford and Partners). Fig. 2 (centre), Bata shoe shop, Regent Street, London, W.1 (architects, Katz and Vaughan). Fig. 3 (bottom) office in Mies van der Rohe's Seagram Building, New York.

DESIGN symposium

(continued)

development of louvred and luminous ceilings, and of lighting schemes in which bare fluorescent lamps are used between deep baffles that cut off the view of the lamps from normal angles of vision. (With the latter arrangement, a high percentage of the light output is directed on to the working plane, while the lamps also illuminate the baffles, giving the effect of a bright ceiling and a generally well-lit interior.)

Luminous and louvred ceilings can be completely under the control of the architect, the ceiling being designed by him in relation to the needs of the building, as in the majority of spaces at Saarinan's General Motors' Technical Center, Detroit, or in Mies van der Rohe's Seagram Building (see Fig. 3). Ceilings of this type cannot be considered as standard lighting fittings, though early experiments by architects were followed swiftly by manufacturers producing standardized ceilings for sale, based on a limited number of modular grids to which the architect must work. While these products are necessitated by economic pressure, it does not necessarily follow that they are in the best interests of architectural development and, unless they provide some flexibility that can satisfy individual requirements, they will produce the same type of resentment from the more far-sighted designer as does the conventional fitting.

New lamps for old

The rejection of the 'lighting fitting' has had a considerable influence on the type of equipment put on the market by the more progressive manufacturers, and it may be of interest to trace the various lines of development that have taken place.

There are on the market today many varieties of lamp which do not require any additional equipment to enable them to function effectively. There are, for example, tungsten-filament internally-silvered reflector lamps, for both mains and low voltage; lamps that give a linear distribution of light, for placing in cornices, etc.; and the PAR lamp for use externally. For a variety of purposes, lamps of these types have completely replaced conventional fittings. Similarly, the fluorescent reflector lamp offers the same simple solution to certain lighting problems. Equipment manufacturers, too have been quick to anticipate this trend, and there appear to be two distinct lines of development—the decorative, and the anonymous.

The decorative approach

Decorative fittings are becoming *more* decorative. It has been recognized that the more decorative a fitting is, the less easy it will be to make it efficient and, therefore, it is better not to try. This is well illustrated by the new Atlas decorative 'Chelsea' range of glassware, which is intended primarily to light itself, which it does beautifully.

The GEC in their 'Variform' range have tried to cater for the architect's need to feel control over his own design, by making possible an enormous number of permutations of a few basic brackets and shades. Decorative quality can rarely be combined successfully with efficiency and, where efficiency is gained, as in the various opal-glass ranges, the decorative quality of the fittings is doubtful; hence a recent return to relative inefficiency by the addition of colour. This, then, is one line of development—decoration, 'inefficiency', colour and sparkle, all of which can justifiably be provided by the individual and self-conscious 'fitting'.

The anonymous approach

The introduction of the suspended ceiling provided an opportunity for the use of recessed equipment, and architects have seized this opportunity to conceal the lighting equipment, by hiding it above the ceiling. Manufacturers, quick to jump on the bandwagon, have created suitable ranges of 'recessed equipment' for both tungsten-filament and fluorescent lamps.

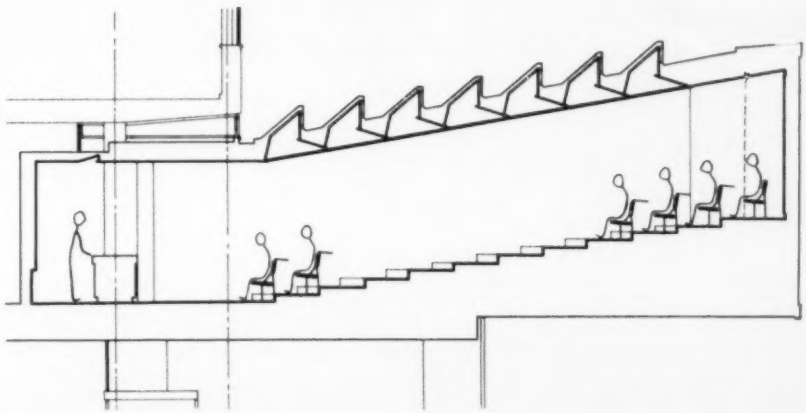
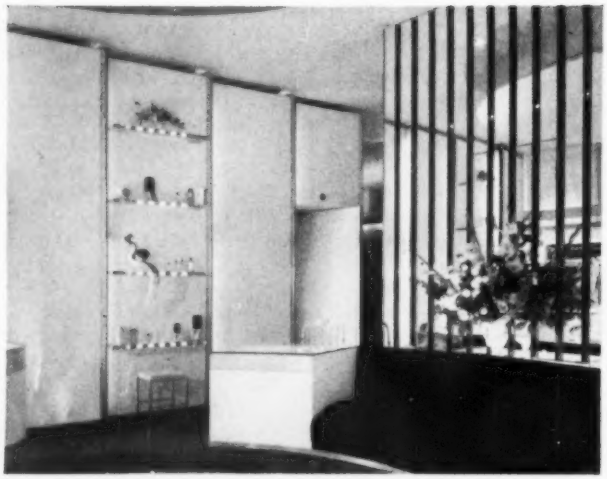


Fig. 4 (top), Chairman's office, Thorn House, London (architects, Basil Spence & Partners). Fig. 5 (right), section through lecture theatre in new building for the Faculty of Engineering at Southampton University (architects, Basil Spence & Partners). Opposite page shows interior view of same theatre.



Figs. 7 (above) and 8 (right) reception room and retail showroom, respectively, at Yardleys, Bond Street, London (interior design by Dennis Lennon, MC, ARIBA).

DESIGN symposium (continued)

This type of equipment is simple and unobtrusive.

Such an approach has a natural appeal for the architect, as the way in which these simple standard units are placed is entirely under his own control, while the units themselves are sufficiently unselfconscious not to disturb him. In one of the newest office blocks in central London (Castrol House), Gollins, Melvin, Ward & Partners, the architects, have used, in general office areas, long lines of recessed equipment, well related to the design of the ceiling. The only 'visible' fittings are those that perform primarily a decorative function. Similarly, in the chairman's office of Basil Spence's Thorn House (see Fig. 4), where a high intensity of light over the desk is provided by a basically efficient system of reflector spots in the ceiling, 'decoration' is added to the space by the introduction of a pendant glass fitting.

New fittings for old

Lighting fitting manufacturers now provide basic equipment which can be utilized by the architects in a variety of ways related to structure and decoration. The fluorescent batten is available from many makers for placing above louvres or luminous panels, behind pelmets and above cornices, and modern production techniques enable such fittings to be produced so cheaply that it may be more economic to place them in such locations than to pay an electrical contractor to install separate fluorescent lamps and control gear. Similarly, simple and cheaply produced tungsten-filament equipment can be employed for 'wall washing' or other special purposes in a manner that enables the architect to feel that he is in complete control of the spaces he has created.

Flexibility

This approach, with the architect more concerned with the way in which the various building elements will appear to the eye, than with the appearance of the lighting equipment, is in line with contemporary architectural thought, and there is little likelihood of a return to the individual fitting for areas where efficient lighting must be combined with good appearance.

American equipment manufacturers are already aware of this, and there is scarcely an individual fluorescent fitting which is not designed in such a way that it can be extended in lines or formed into patterns; the variety of recessed equipment for all types of source is unlimited; while basic equipment has been developed for use above louvres and diffusers, or for concealment by the structure, that satisfies the stringent requirements of electrical safety and ease of installation. Manufacturing technique for such equipment is recognized as being the problem of the manufacturer, while the design of decorative equipment is recognized as the province of the specialist designer.

The future

What the best architects do today will, no doubt, be standard practice in the future, and it is, therefore, of the greatest interest to study the work of the more important architectural offices. Basil Spence has just completed an engineering building for Southampton University, in the lecture theatre of which (see Figs. 5 and 6) daylighting and artificial lighting are combined

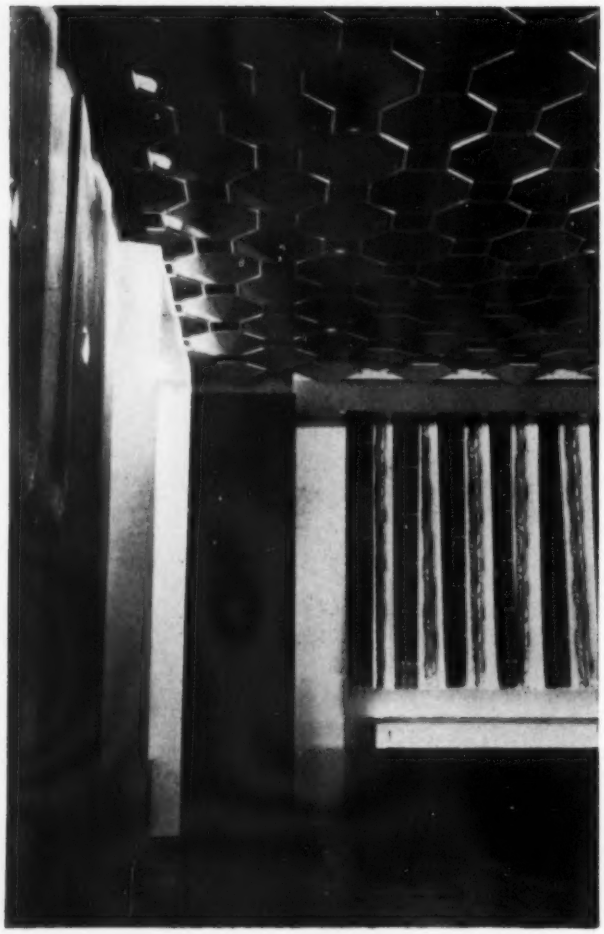
in an ingenious way so that the natural lighting is controlled by adjustable baffles, while concealed fluorescent lamps give artificial lighting of a similar distribution. The result is glare-free lighting from both sources without the use of conventional lighting fittings.

In his designs for Yardley's new Bond Street showrooms (see Figs. 7 and 8) Dennis Lennon has obtained his effects from miniature light sources concealed in the uprights of a metal screen; from pelmets above the doors, and from lights concealed in tables, wall recesses and above lowered areas of ceiling.

An American living room seen in Fig 9 provides an example of the use of a specially domed ceiling that permits concealed lighting around its edge to curtains and walls, and to a raised portion in the centre. A 'black hole' fitting is added where a high intensity of downlighting is required for

Fig. 9 (right) concealed lighting in the living room of an American home. Fig. 10 (below) lighting from fluorescent lamps in continuous louvred troughs in the concourse of Gatwick Airport (architects, Yorke, Rosenberg and Mardall).

Fig. 11 (above), rows of bare fluorescent lamps suspended end to end in the departure lounge of Gatwick Airport (architects, Yorke, Rosenberg and Mardall).
Fig. 12 (below) banqueting room of the new livery hall of the Carpenters' Company (architect, Austen Hall; lighting consultant, Derek Phillips).



picking out a flower arrangement. Here again the eye is conscious of the space, and its surfaces, not of the lighting equipment.

Gatwick Airport

At Gatwick Airport, Brian Henderson of Yorke, Rosenberg and Mardall, achieved a high intensity of light in the main concourse (Fig. 10) by means of fluorescent lamps placed in large curved glass-fibre reflectors above the suspended ceiling, the light sources being cut off from view by deep vertical slats of wired glass. There were many other interesting solutions to the lighting problems of Gatwick Airport, including the use of a long line of 5 ft. 50-watt fluorescent lamps, placed end-to-end to emphasize the direction of the departure lounge (Fig. 11)—a solution that required the placing of the control gear remotely from the lamps, while it was necessary for the lamps themselves to be fixed with great accuracy by the electrical contractor. Except for decorative purposes standard fittings were avoided throughout this building.

Other examples

Many other examples might be cited, such as the Birmingham Art Gallery (see *Light and Lighting* for August, 1958), but one further example only will be described. In the banqueting room of the redesigned livery hall of the Carpenters' Company, the architect, Austen Hall, has adopted what may prove to be a new look for a room traditionally lit by pendant chandeliers. The whole concept is a departure from tradition, the lighting no less than the architecture. The ceiling consists of octagonal cedarwood pyramoids, set against a dark-blue background of absorbent material. In certain of the squares are placed Troughton and Young downlighting fittings housing 300-watt tungsten lamps, designed to throw their light through dark openings so that the presence of the light sources remains unnoticed except on close inspection. Other light sources concealed behind black louvres flood the walls and the ceiling with light (see Fig. 12). It is particularly significant that in a programme so steeped in tradition, the visual impression is complete absence of lighting fittings.

Perhaps the battle between the architect and the lighting equipment manufacturer is drawing to a close.

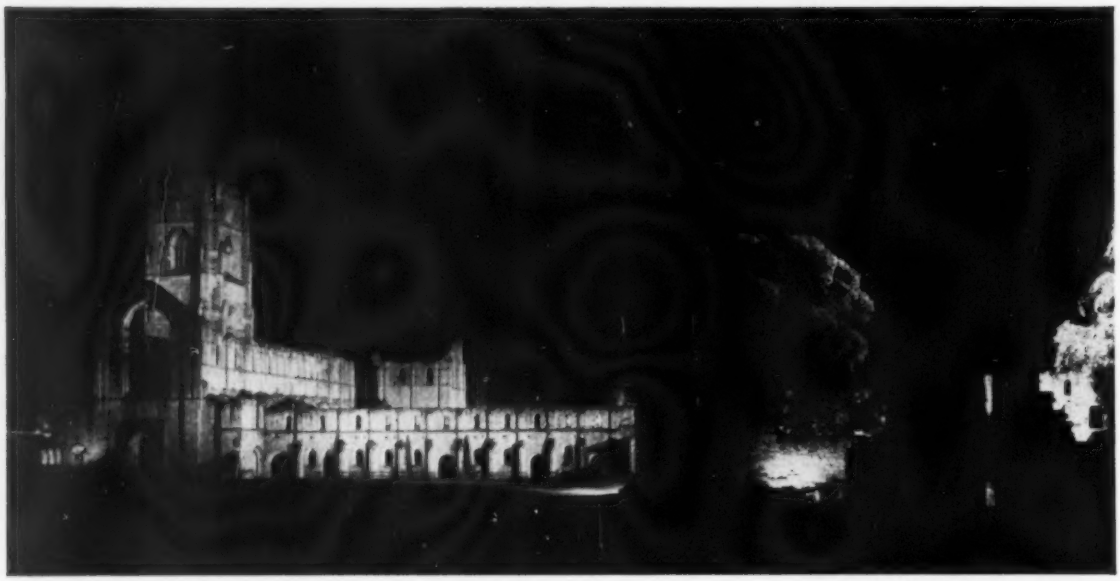


Fig. 1. View from the west, near the entrance to the Abbey grounds.

Fountains Abbey

Description of the installation of floodlighting promoted by The Illuminating Engineering Society in May by permission of the owner of Fountains Abbey and carried out by the co-operative help of members of the Society. In use for only a few days in May, the installation will be switched-on again in September for a few weeks: it is hoped that it will become a permanent attraction to visitors to Yorkshire.

WHEN THE PROGRAMME for the recent IES Summer Meeting was being prepared, the suggestion was made that Fountains Abbey, which is only a few miles from Harrogate, might be floodlit and the IES Summer Meeting Committee appointed a small panel under Mr C. Dykes Brown to look into the matter. The owner of the Abbey, Mr Henry Vyner, was approached and permission for a scheme to be prepared was readily given. Though the Society would, of course, be responsible for any such floodlighting, the scheme could only be carried out with the co-operation of a number of Sustaining Members and with careful co-ordination on the design of the installation. Accordingly, Mr C. R. Passmore of Atlas Lighting Ltd. and Mr M. W. Peirce of the General Electric Co. Ltd. were asked to undertake the preliminary investigations and to make proposals.

Planning the installation

Mr Passmore and Mr Peirce first visited the Abbey at the end of December when it was clear to them that the site was an ideal one for floodlighting. Figs. 1 to 4 give some idea of the site and its possibilities.

One of the features of the site is that in addition to being able to view the Abbey from the exterior, spectators are also able to walk at will through the many buildings and ruins, so that both exterior and interior views had to be considered.

From this visit came the proposal that the lighting should be in two main parts—dominant 'exterior' lighting from a single tower supporting sufficient floodlights to illuminate the whole area, with 'interior' lighting which would supplement the dominant lighting to emphasise points of interest and to provide contrasts in colour and in light and shade. It was also felt that in order to achieve an installation which would attract visitors to the Abbey the scheme should be such that it was impressive on first entering the site, and also that it should have features to hold the interest of spectators as they walk round the site. (In the report which was made to the IES Summer Meeting Committee it was recommended that a prescribed route should be laid down for spectators in order to facilitate the siting of local lighting units. This recommendation was adopted for the IES visit on May 16.) The possibility of incorporating dimming was considered but was rejected as it was felt that there was already sufficient visual variety and any cyclic change in the lighting would be disturbing.

The proposals by Mr Passmore and Mr Peirce in regard to the type of equipment to be used, the general lighting plan, wiring and the provision of a 60 ft. tower of tubular scaffolding which was to be situated inconspicuously against the trees to the south of the Abbey, were submitted to the Studley Estate together with estimated costs. The estate agreed to make a contribution to the initial costs, certain Sustaining Members of the Society agreed to loan equipment and the North Eastern Electricity Board agreed to provide a supply of electricity, on the understanding that the installation should be in use during the week of the Summer Meeting and later in the year by the estate. If the installation proved an attraction to visitors the estate would consider buying the whole installation.

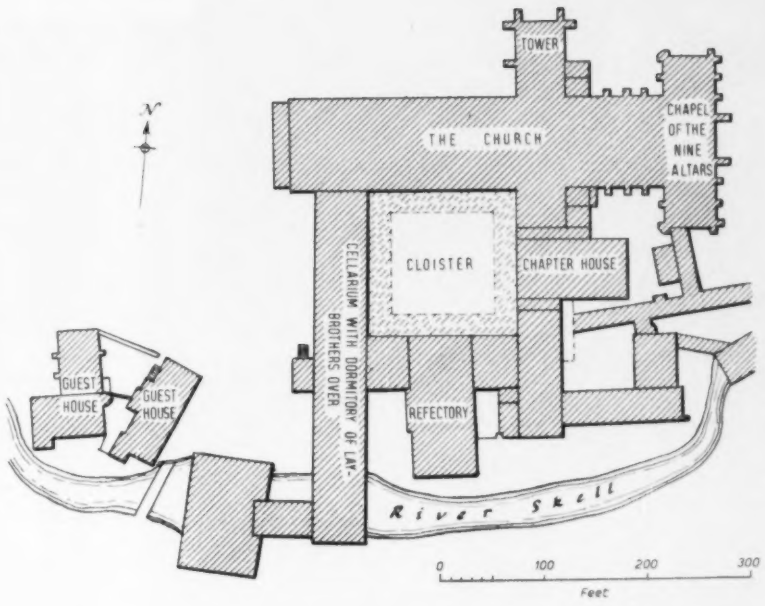
The decision having been taken to proceed, a further site meeting took place and the installation work put in the hands of

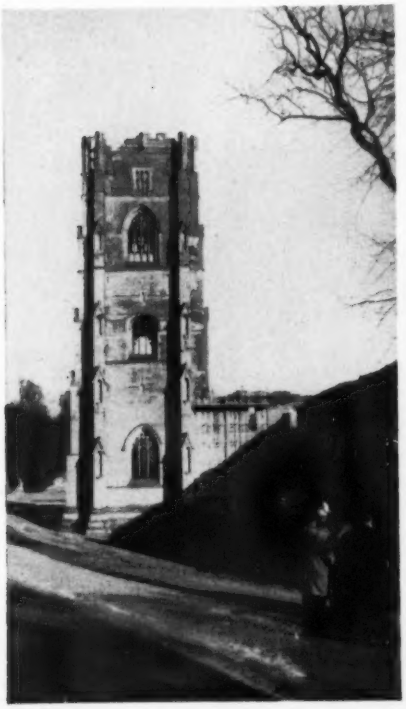
Mr Richard Green of Green & Smith Ltd.

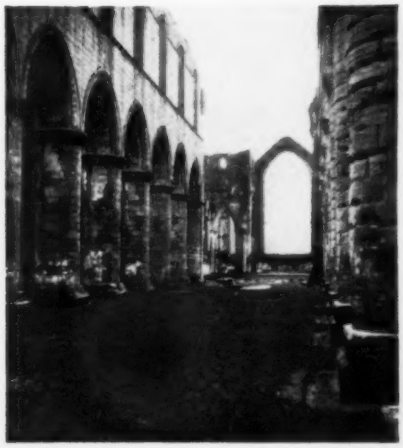
The number of floodlights for the dominant lighting was calculated. The ground area of the site is approximately 400 ft by 450 ft and the throw from the floodlighting tower to the tower of the Abbey is 700 ft. It was calculated that 20 floodlighting lanterns with 1,500-watt class B2 lamps would each provide a spot of 140 ft. diameter with a maximum illumination of 1 lm/ft² which it was considered would be sufficient to give the desired effect, particularly as uniformity over the area was not required and the beams were to be directed towards different features to give them emphasis.

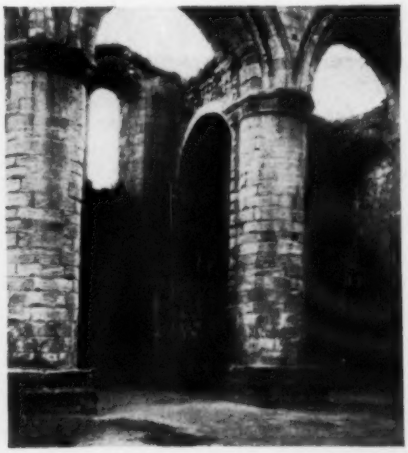
The positions of the local lighting reflectors, mainly fluorescent, were visualised at this visit though the exact positions were left until the installation could be switched on. The colours to be used were also considered at this stage. The final placing of these local reflectors did in fact agree very closely with the general plan drawn up at this visit though some changes were made in both positions and colours—and advantage was taken of some effects which were not apparent until the lighting was switched on.

The final focusing of projectors and the placing of local reflectors was done a few days before the official switch-on by the Bishop of Ripon on May 16. The floodlights on the tower forming the dominant group were focused and trained onto the walls and the Abbey tower. In this connection the appearance of the Abbey from the entrance was of first importance









Daylight views of the Abbey. Fig. 2 (above) from the lawn looking south-east; Fig. 3 (left) the Church Tower; Fig. 4 (below left) the Nave looking east towards the Chapel of the Nine Altars; Fig. 5 (below right) two bays of the south aisle of the Nave.

Fig. 6 (above) the south-west corner of the Abbey buildings and the bridge over the mill stream. Fig. 5 (below) the west end of the Nave, the tower and the lighting of the trees and cliff to the north of the Church.

and it was found that the number of lanterns gave very satisfactory results. These having been trained, the local lighting was then settled in detail by following the route which had been laid down for the opening night. At this stage it was found that some of the fittings were too conspicuous by day and some modifications on placing were made. The general view from the entrance (Fig. 1) was built up as originally visualised with the dominant lighting plus green, blue and gold lighting along the base of the cliff and amongst the trees to the north of the Abbey which help to frame the church.

Tour of the Abbey

The best way to describe the installation in detail is probably to follow the route taken by visitors on the opening night. From the entrance one took to the road towards the floodlighting tower to the bridge over the mill stream (seen on the right of Fig. 6) where coloured fluorescent lights were concealed under the bridge and reflected in the water.

After crossing the bridge and walking across the lawn in front of the Cellarium we come to the close-up view of the west end of the Nave (Fig. 7). Of particular note are the columns within the nave, the delicate colonnade on the left of the picture which

was specially lighted so that the visitor would not fail to see it, the lighted trees to the left of the picture, and the illuminated interior of the tower seen through the lowest window.

Entering the west door to the Nave we have a view (Fig. 8) which may be compared with the day light view (Fig. 4). In artificial light the columns to the right are directionally lighted with de-luxe natural tubes, one in each bay. On the left the columns and wall above have splashes of light caused by floods on the distant tower and, being yellow compared with the general light, they look like sunlight as also does the streak of additional light across the top of the large east window. The lighted area in the back-ground of this picture is the Chapel of Nine Altars where the lighting was blue on one side changing to red towards the other. The dark area between the nave columns and the Chapel of Nine Altars is the Presbytery which was left unlighted in order to emphasize the many chapels and the base of the tower which lead from it.

In the South aisle of the Nave are two small doorways one leading into the Cellarium and the other into the Cloisters. The view through each of these doorways was worth looking at. From the first, a distant view is obtained of the picture in Fig. 11. From the second one sees the Cloisters (Fig. 10) and in particular the little archway with steps in the background attracts one's attention.

Fig. 8 (above left) the Nave. Note the modelling of the columns on the right and the splashes of light from the distant floodlighting tower on the left. In the background is the east window in the Chapel of Nine Altars. Fig. 9 (above) the Chapel of Nine Altars lit by coloured fluorescent lamps on the ground, with the tops of the arches picking up light from the floodlighting tower.

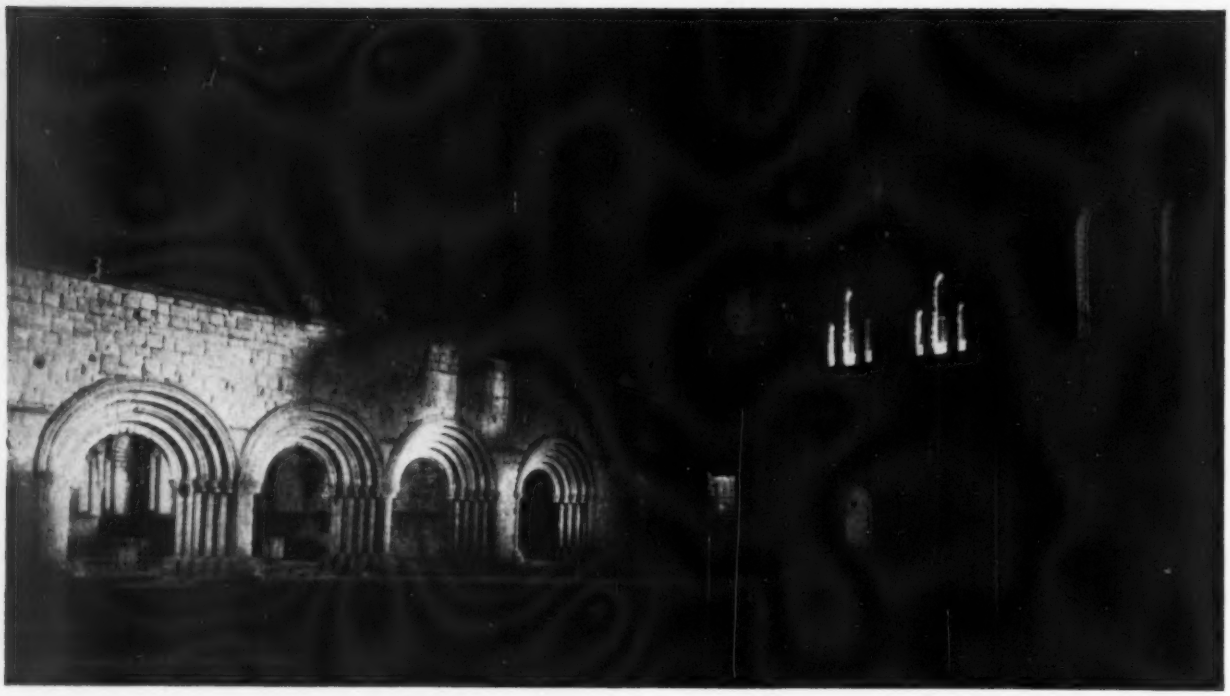


Fig. 10 (above) the Cloisters. Note the modelling of the Norman arches and the illuminated doorways and windows. Fig. 11 (below) the Cellarium, the only remaining roofed-in area of the Abbey, lit by diffused light from the left and strong directional light through the windows on the right.

The lovely Norman arches seen in Fig. 10 needed some additional treatment at the last minute. It was Mr Vyner who pointed out that they were not being seen to full advantage because the dominant floodlights only lighted part of the first one (on the left). Some additional 150 watt floods were installed across the Cloister to light the remaining arches from a similar direction. These three arches lead into the very beautiful Chapter House which was lighted in a contrasting colour.

At the end of the Nave is the Chapel of Nine Altars. The original plan of placing tubular reflectors on the stone in window recesses was abandoned on grounds of daytime appearance and they were put at ground level on the west, or Nave, side of the Chapel where they are rather vulnerable but otherwise quite satisfactory. Fig. 9 shows the view back into the Chapel taken just before leaving it by the south door. The reflector fittings are on the ground on the left and the splashes of light come from the distant floods which pick up the east arch. (Those who saw the actual installation may have noticed the effect of perspective in colour because the light was blue in the distance changing to red in the foreground.)

After leaving the Chapel of Nine Altars there was a fine view of the tower with its interior blue mercury lighting contrasting with the exterior distant tungsten lighting and with the pink light spilling from the chapels which are alongside the Presbytery. If one strayed a little from the set route at this point one was well rewarded with several delightful colour pictures.

The route now led along the south side of the Chapter house and into the Cloisters (Fig. 10). The Norman arches leading to the Chapter house have already been mentioned but they are well worth a second glance. The steps which can be seen in Fig. 10 lead up to the only part of the Abbey which can be regarded as inhabited and the designers of the scheme were surprised and pleased, on climbing these steps on a cold day in December, to find a coke brazier burning away merrily. It gave an opportunity for a welcome warm up and as the room is immediately over the 'Warming House' it was most appropriate. Access to the Warming House is from the doorway which can be seen illuminated to the right of the steps and here an attempt was made to demonstrate the use of the room by having the interior in pink with red light in the fireplace and contrasting this with a cold daylight colour just outside the doorway which leads to the old river bed.

Leading out from the Cloisters through another very remarkable Norman arch is the Refectory. To achieve the desired lighting effect here two of the floodlights on the floodlighting tower were re-directed so as to give additional light on to the ruined windows on the south side. The lighting here was kept rather dim with no local lighting added except some lamps in the gallery at the side from which a monk used to read passages from the Bible while meals were being taken. From the Refectory a doorway leads to the Kitchen within which is a stone enclosure. The designers assumed that this was the oven and decorated the interior with a bright red lamp to emphasize it.

A door from the Kitchen leads into the centre of the Cellarium which was the Monks' store house and is the only remaining roofed-in area. The dormitory of the Lay Brothers was over this room. As may be seen from Fig. 11, the roof of the Cellarium is wonderfully well preserved and many people thought the lighting here to be one of the most striking sights of the itinerary. A white fluorescent tube was concealed behind each of the windows on the left (east) side and the light from these allowed to diffuse across the floor and ceiling from this side. From outside the building and at a distance some tungsten floodlights were placed at low level, ostensibly to illuminate the outside of the building but really to provide the 'sunbeams' on the floor which can be seen in the picture. It will be appreciated that real sunbeams would be more parallel than those seen but this fact does not detract from the realism of the picture, the important feature of the effect being the warm tungsten colour contrasted with the white colour of the diffused lighting. The lighting effect in the Cellarium was completed by illuminating the green bank which can be seen through the windows at the end of the building.

In a lighting scheme of the kind of Fountains Abbey many of the lighting effects are achieved but many are as it were 'thrust upon you'. One of the most remarkable of these latter effects was totally unexpected in that the light from the main bank of floodlights created a haze in the sky and from a number of interior positions this haze could be seen through various arches in a way that seemed fantastically beautiful.

The electrical installation was most efficiently carried out and it would be extremely difficult for anyone to trace the runs of cable or even find the fuseboards, so carefully have they been concealed. This feature was an essential part of the project because it is desired that the daytime visitors should be in no way disturbed by the floodlighting arrangements. All switches are grouped together in a wooden hut near the base of the floodlighting tower.

Acknowledgments

As mentioned at the beginning of this article, this outstanding floodlighting installation could not have been carried out without the willing co-operation of many individuals and firms in the lighting industry. The design of the lighting was conceived and carried through by Mr Passmore and Mr Peirce who, together with The Illuminating Engineering Society, wish to place on record their thanks to the following: Mr Richard Green of Green & Smith Ltd and his staff who not only installed all the equipment but had it ready on time in spite of last minute alterations; Mr N. Sharples of Bill Switchgear Ltd who loaned all distribution fuseboards and control switches; Mr Henry Vyner who showed great interest in the scheme and made valuable suggestions during the final tests; and Mr A. C. Page of Atlas Lighting Ltd who co-ordinated the technical aspects of the work locally.

Acknowledgment is also made of the help given by the staff of the Studley Estate, by the North Eastern Electricity Board who provided a special supply for the installation, and by the following firms: Atlas Lighting Ltd., A.E.I. Lamp & Lighting Co. Ltd., Benjamin Electric Ltd., The General Electric Co. Ltd., Mills Scaffold Co. Ltd., Philips Electrical Ltd., and Pirelli General Cable Co. Ltd.

THE LIGHTING DESIGNERS

The sense of drama which is characteristic of much of Mr C. R. Passmore's work stems from some twenty years experience as a lighting supervisor in the theatre. For the last ten years he has been concerned with special effects lighting with Atlas Lighting Ltd. He has been connected with many noteworthy floodlighting schemes and has been able to give full play to his artistic and dramatic faculties in the development of *Son et Lumiere* spectacles in this country.

Mr M. W. Peirce has been with the General Electric Co Ltd since 1928. He has experience of design in a wide range of lighting installations but in particular has a flair for installations which are out of the ordinary or which have a strong artistic element. His experience of floodlighting includes the first large scale installations in this country for the International Illumination Congress in 1931, the King George V jubilee celebrations and two coronations.

Changing Patterns in Electricity Board Showroom Lighting

Colour-change lighting used for special effects in new showroom of South Wales Electricity Board at Cardiff

Front part of the South Wales Electricity Board's new showroom at The Hayes, Cardiff, depicting the special fluorescent fittings. To the left can be seen a spot-lighting lantern of the special-effects lighting lowered from its trap.

THE PRINCIPAL SHOWROOM of the South Wales Electricity Board is that at The Hayes, in Cardiff. Originally built as a fish market, it was not until 1936 that it was converted to serve as showroom and offices for the old Cardiff Electricity Department. With today's high standard of new shops in Cardiff, it was decided that the showroom must be constructed, installing lighting of high quality to attract custom. The new showroom was opened on March 1.

In the old building, the ground floor comprised a showroom, demonstration theatre and various offices. In the re-construction, theatre and offices were removed and the whole of the ground floor rearranged as a selling area, with desks for paying accounts and dealing with inquiries.

Over most of the area, an average illumination of more than 50 lm/ft² has been provided by means of 19 specially designed fluorescent fittings, 34 ft long and laterally spaced at just over 3 ft intervals. Housing four, 8 ft, 125 W tubes, each fitting comprises two, 16 in. deep, parallel metal sheets, open at top and bottom and enammelled white inside and black outside, with small star-shaped perforations adding sparkle. The fittings were made by Courtney, Pope (Electrical) Ltd, to the design of the consulting architects, Sir Percy Thomas & Son.

For the desks at the side of the area, additional lighting is provided by seven fittings recessed into a black ceiling panel, each housing three 5 ft 80 W lamps. This is supplemented by a number of perforated metal fittings housing 100 W tungsten lamps at lower levels. Due to the non-rectangular shape of the room, the front part of the showroom could not be covered by the 34 ft fittings and has been illuminated by 150 W recessed reflector fittings.

An important feature of the lighting is the use of electronic dimmers operating on both fluorescent and tungsten lamps to impart animation to the scene after closing hours. The dimming equipment and certain fluorescent and tungsten flood and spot lanterns were installed in the old demonstration theatre and it was realized that these could be re-used in the new showroom.

The special-effects lighting consists of 240 V reflector lamps and 12 V narrow beam spot lamps together with portable fluorescent fittings placed on the floor and each housing three 5 ft tubes of different colours. To avoid wrong connections 5 amp 3 pin, special 2 pin, and 10 amp 7 pin plugs and sockets respectively are used. Additional spot lighting is provided by five 500 W theatre type spotlighting lanterns suspended from the ceiling just behind the front windows which are retracted and covered by trap doors when not in use.

In operation, lanterns, either singly or in groups, are raised to a pre-set brilliance and extinguished in a previously determined six-stage sequence to which is synchronized a three-colour background change.

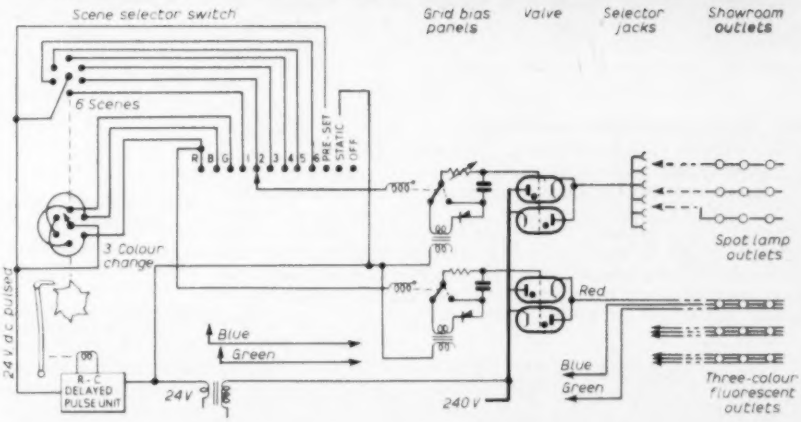
The equipment used to effect these changes is shown diagrammatically in the diagram. It comprises a composite switching board together with a bank of 14 pairs of thyratrons, each pair being connected in reverse-parallel to obtain full-wave modulation of the alternating current passing through the pair. The outputs of the thyratrons feed a jack board to which the various circuits in the showrooms are connected, as required. These exceed in number and capacity that with which the control board can cope, but since the circuits are not all needed at the same time, such an arrangement allows the electronic panel to be used to its maximum advantage.

The switching unit incorporates automatic switches which charge and discharge capacitors through a rectifier and adjustable resistance. The resultant pressure across the capacitor determines the grid striking voltage of the thyratrons and hence the degree of main current modulation. The rate of change of grid voltage is set by a variable resistor.

The heart of the unit consists of two 6-way rotary switches on a common spindle. This is notched forward one contact, after an interval which is pre-set, by a pawl and rachet actuated by an electromagnet. This magnet is fed from a pulse-forming unit which gives a delayed 24 V d.c. pulse. One of the 6-way switches has the contacts cross connected so that in effect there are three contact positions repeated twice each revolution. These initiate the three-colour change. The three outgoing leads together with the six from the other switch are looped to nine of the contacts of a number of 12-way hand-set selector switches, each one of which is associated with a pair of thyratrons. The required timed energization of the thyratrons can thus be selected from the cycle. Of the three outstanding contacts the tenth gives connection at a pre-set voltage to the pulse generator, giving lamp operation every time the switch is notched. The eleventh is a 'static' position in which the thyratrons conduct continually; the twelfth is 'off'.

The scheme was prepared and installed by the Board's Cardiff District Office, with technical advice from F. H. Pulvermacher and C. R. Passmore.

Top, the account-payment desk illustrating the decorative fittings employed.
Centre, schematic diagram of the special-effects lighting.
Bottom, general view of the new showroom at Cardiff looking down towards the entrance.



LIGHTING ABSTRACTS

OPTICS AND PHOTOMETRY

859. On the foundations of goniophotometry. 535.24
D. E. SPENCER and S. M. GRAY, *Illum Engng*, **55**, 228-232 (*April* 1960).

Measurements obtained by conventional goniophotometric techniques of the reflectance or transmittance of imperfectly diffusing materials are dependent on the illuminating and viewing systems of the goniophotometer as well as on the photometric characteristics of the samples, and consequently provide insufficient information to predict the appearance of the samples under other illuminating and viewing arrangements. It is claimed that this disadvantage is overcome in the proposed technique, where measurements are made with a uniform source of variable size, large enough to fill the field of view of the receptor. An extrapolation of the observed data to zero source size enables both the specular and diffuse components of either the reflected or transmitted light to be directly obtained. P. P.

860. The measurement of street lighting. 628.971.6
G. NILSSON and B. NILSSON, *Ljuskultur*, **32**, 91-92, No. 2 (*April-June* 1960). *In Swedish.*

In order to overcome the lack of sensitivity of cosine-corrected rectifier cells, G. Nilsson proposes a parallelled group of several uncorrected cells mounted on a tilting inclinometer device so that light can always be received from a distant fitting at normal incidence. B. Nilsson points out the difficulty of screening the cells from extraneous light from other fittings or specular reflections in the road surface. R. G. H.

861. Two centuries of the science of light. 535.24
O. REEB, *Lichttechnik*, **12**, 289-294 (*May* 1960). *In German.*

The two books generally regarded as the first treatises on photometry both appeared in 1760. Bouguer's 'Traité d'Optique' and Lambert's 'Photometria' described experimental work and theoretical deductions on which this type of measurement is based. The author gives a brief account of the lives of the two pioneers and goes on to describe the principal contributions made by each. He concludes by pointing out that the only subsequent developments that can be regarded as of comparable importance are the establishment of (i) methods of heterochromatic photometry, (ii) a standard of light and (iii) physical methods of photometry. The article is illustrated with a number of reproductions from the two books, two portraits of Lambert and one of Bouguer. J. W. T. W.

535.24
862. Programming the IBM 704 computer for photometric data reduction, documentation and application.
A. B. GOUGH, *Illum Engng*, **55**, 203-212 (*April* 1960).

An automatic distribution photometer recording on punched cards which are subsequently fed into an electronic computer provide a means for automatically plotting iso-illumination contours for complete installations of the fitting under test. Block diagrams are used to illustrate the stages in obtaining and recording the photometric data, in processing these data for individual fittings and in combining the data from a number of fittings at given spacings and mounting heights. The lighting of a football field by 1500 W floodlights is used to illustrate the steps in the calculation procedure. P. P.

863. The application of phosphors in lighting 535.37
A. H. MCKEAG, *Trans Illum Eng Soc* (*London*), **25**, 41-49 (No. 2, 1960).

Phosphors for lighting purposes are principally used in low-pressure mercury vapour (fluorescent) lamps and colour-corrected high-pressure mercury vapour lamps. Research during the past thirty years has led to the early sulphide phosphors being superseded by a whole range of alternative phosphors giving improved colour appearance, higher luminous efficiencies and better lumen maintenance. The mechanism determining these factors is discussed, and the ways in which present-day manufacturing techniques have been adapted to produce phosphors of superior performance are described. P. P.

LAMPS AND FITTINGS

621.327.534.15
864. Measurements on capacitors used as auxiliaries in low voltage fluorescent lamp circuits.
Lichttechnik, **12**, 299-301 (*May* 1960). *In German.*

Criticisms by H. Ramert of a paper by C. H. Sturm (See abtract 804 in March 1960) and a reply by the author. J. W. T. W.

621.327.534.15
865. Ballast losses and their influence on the economics of fluorescent lighting.
S. WRETEMARK and B. NILSSON, *Ljuskultur*, **32**, 93-99, No. 2 (*April-June* 1960). *In Swedish.*

A detailed study is made of the ballast losses which occur with different materials, construction and mounting of the ballast elements. A cost analysis made of these ballast losses shows how a better design with a higher initial ballast cost (e.g. by increasing the copper cross-section in the choke windings) may be offset by reduced losses over the running period. R. G. H.

LIGHTING

866. Flashing lights as landing aids on airfields. 628.975
F. STAUFFERT, *Lichttechnik*, **12**, 299-301 (*May* 1960). *In German.*

It has been found that under adverse weather conditions, pilots can detect a flashing light of high intensity (30-40 million cd) before a fixed light giving up to 10^5 cd and the use of projectors with xenon lamps giving a 1 millisec flash is useful as a supplement to the fixed light system. With a Calvert arrangement of lights, the lamps flash in succession at intervals of $\frac{1}{40}$ sec and the cycle is repeated twice per second. Two airports in Germany now have such a scheme in operation on an experimental basis. J. W. T. W.

867. Lighting calculations for thirty-five thousand rooms 628.93
P. F. O'BRIEN, *Illum Engng*, **55**, 215-224 (*April* 1960).

A digital computer has been used to solve the radiation transfer functions necessary to determine the distributions of relative illumination and luminance in 35,000 rooms having different geometries and reflectance distributions. Data for 160 of these rooms are given in the present paper. The complete data will be separately published. The information is of value in determining the magnitude of the error introduced by assuming that all rooms having the same 'proportion index' (domance) have the same relative illumination and luminance distributions regardless of shape (i.e. a square room, a circular room, a long finite room or an infinitely long room). It is shown that in general the assumption leads to an error of less than 10%. P. P.

868. Light and productivity. 628.972
A. N. IRENS, *Trans Illum Eng Soc* (*London*), **25**, 53-68 (No. 2, 1960).

Graphs and diagrams illustrate how the 'cost of light' has progressively decreased during the past 50 years due to the greatly reduced cost of electricity and the more efficient conversion of energy. The average lighting cost works out at about 1.37% of the wages paid during lighting hours. The case for good lighting is strengthed by the improved output it brings. P. P.

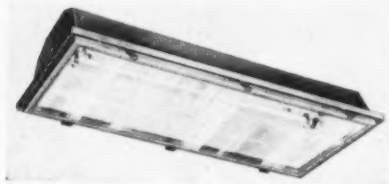
869. Lighting of bridges on board ship. 628.979
W. ADRIAN, *Lichttechnik*, **12**, 351-354 (*June* 1960). *In German.*

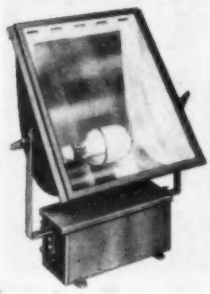
Glare caused to a ship's navigator by the light from instrument dials was investigated by determining the threshold luminance for visibility of a test object when a glare source was placed in two positions with respect to it, positions typical of those met in practice. Measurements were made with white and red light, the latter giving a considerably lower threshold. The visual acuity of the eye was found to be greater by red than by white light; equal acuity was found when the illumination by red light was 28% of that by white. J. W. T. W.

NEW PRODUCTS

Floodlighting lanterns

A NUMBER OF NEW FLOODLIGHTING lanterns have recently been introduced by Rowlands Electrical Accessories Ltd, notably designs making use of 3 ft, 200 W sodium linear lamps. There are two such units; one is an upward-lighting lantern with specular asymmetric reflector and the other a weatherproof dispersive reflector for downward lighting. This is supplied for one or two lamps, with or without enclosing visor of toughened glass. REAL have also introduced upward and downward lighting lanterns for 250/400 W, MBF/U colour-corrected mercury-vapour lamps. Both have specular reflectors, the upward unit asymmetric, the downward unit symmetric.





Above is the downward lighting version of REAL'S new lantern for 3 ft sodium lamps; left, their upward lighting unit for 250/400 W, MBF/U lamps.

The originators of the 200 W sodium lamp have also produced a floodlighting lantern for use with it. The lantern is of the upward lighting type, fitted with a specular parabolic asymmetric reflector of electro-brightened aluminium giving a wide angle beam, and is available with or without control gear box.

Rowlands Electrical Accessories Ltd, REAL Works, Hockley Hill, Birmingham 18.

*Lamps and Lighting Department, AEI Radio and Electronic Components Division, 38/39 Upper Thames Street, London, EC*4.

Low-price batten fittings

DEMAND FOR INEXPENSIVE BATTEN fluorescent fittings appears to be as high as ever, to judge from the growing number of this type of fitting on the market, the latest to join the field being C. M. Churchouse Ltd, Fluorel Ltd and Revo Electric Co. For 4 ft, 40 W lamps, Churchouse offer their new batten at £2 10*s*. It is constructed from sheet metal finished in hard-gloss white enamel paint and supplied complete with bi-pin lampholders and control gear. Lampholders are novel in that they incorporate a ratchet lock arrangement which is stated to eliminate the danger of accidentally dislodging the lamp during cleaning. The Fluorel fitting is for 5 ft lamps and is of the new 'slim look'. The gear channel is finished in light grey, providing a two-tone effect with the white finish of the ends and cover. Spring-loaded bi-pin lampholders are fitted; retail price is £3 18*s*. The last in this list, from Revo, is their 'Uti-Lite', basically a single-lamp batten but capable of being adapted to take a reflector. To convert the batten to a reflector unit, the lampholders are removed by being passed through bridges in the upper side of the channel, the channel then inverted to enable the reflector to be attached to it with two screws, and the lampholders replaced. It is of steel finished in white stove-enamelled paint and is available for both 4 ft and 5 ft lamps, priced at £3 5*s* and £3 17*s* 6*d* respectively.

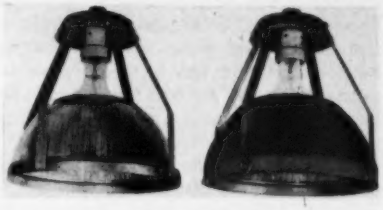
*C. M. Churchouse Ltd, Clarendon Works, Clarendon Cross, London, W*11.

*Fluorel Ltd, Midland Road, Leyton, E*10.

Revo Electric Co Ltd, Groveland Road, Tipton, Staffs.

Heavy-duty high-bay fittings

A NEW RANGE OF heavy-duty prismatic fittings is now available from Holophane for high-bay mounting. Basically the fittings comprise a cast-metal canopy protecting the lampholders and to which four straps are fixed supporting a ring on which the prismatic reflector is mounted. One version, designed for use in steelworks, heavy engineering shops and large assembly areas, is also provided with a steel cover for the reflector. Three types of reflector are available for use with this covered version, for mercury discharge lamps from 400 to 1,000 W and for filament lamps from 1,000 to 1,500 W. For the 1,000 W MB and MBF lamps, the prismatic system provides a broad intensive light dispersion. The uncovered versions, suitable for aircraft hangars, power stations, factories and erection bays, where some upward lighting is required, have prismatic reflectors providing semi-direct distribution between extensive and focusing. The lamps covered are 300 to 1,500 W g.l.s. and 400 to 1,000 W MB or MBF.



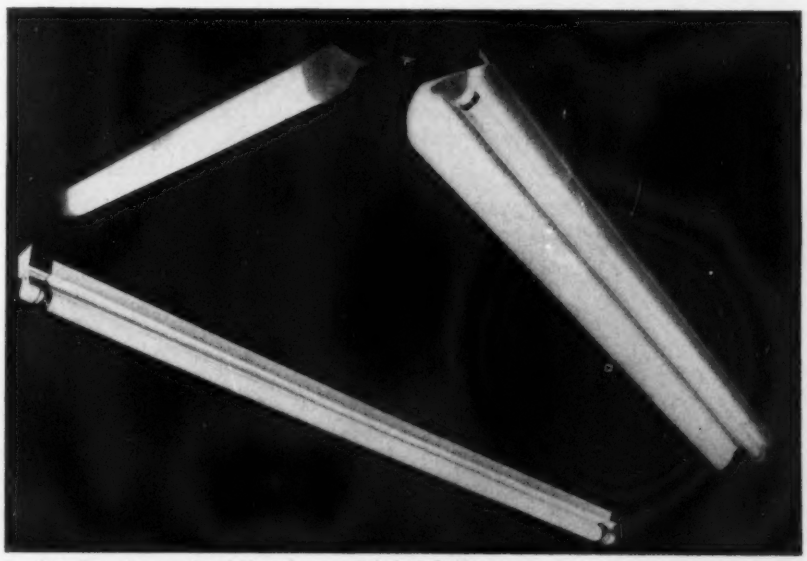
Covered and uncovered high-bay fittings from Holophane.

*Holophane Ltd, Elverton St, London, SW*1.

'Tubalux' range extended

TROUGHTON AND YOUNG HAVE ADDED a new surface fitting to their 'Tubulax' fluorescent range. It is in two sizes, 4 ft 40 W and 5 ft 80 W. Both sizes have metalwork finish in stove-enamelled white paint and a diffuser of moulded opal 'Perspex' which lifts out for access.

Troughton and Young (Lighting) Ltd, 143 *Knightsbridge, London, SW*1.



Top left, Troughton and and Young's new 'Tubalux' fitting; bottom left, the 'two-tone' batten fitting from Fluorel; right, Revo's new batten fitting with reflector fitted.

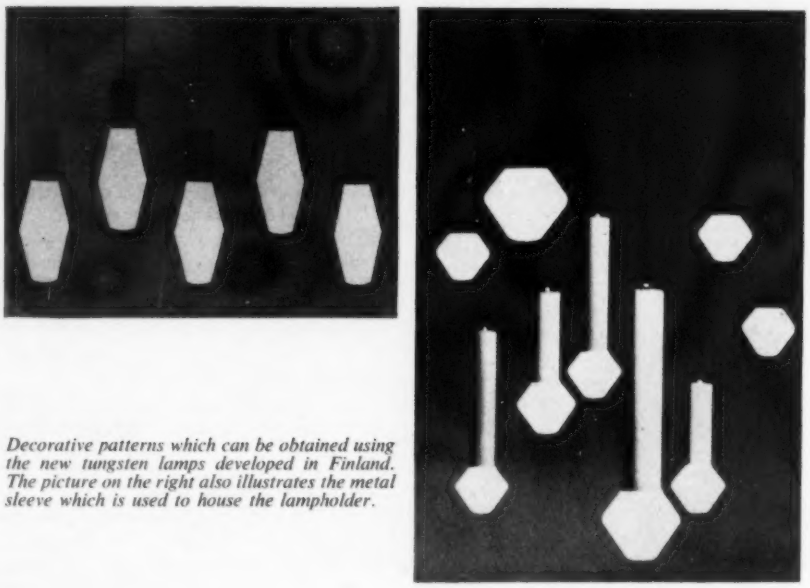
New Decorative Styles for Filament Lamps

Germany, US and Finland introduce new bulb shapes for domestic use without shades or glassware

WITH THE ATTENTION of the lamp industry devoted in the main to developing tubular fluorescent and other discharge lamps to their present high technical level, the tungsten filament lamp was, in the post-war decade, largely left on one side. Cinderella-like, it is now making a return to the limelight in new and much more decorative forms which are also incorporating some of the functions performed by fittings.

The first step away from the traditional appearance of filament lamps was the addition of an internal silica coating to obtain better diffusion. This has been followed more recently by smaller and mushroom-shaped bulbs. The latest step, reported from Germany, Finland and the U.S., is even more marked; the designers have followed the style of modern lighting glassware to provide a light source with a large, attractively-shaped bulb which has good diffusing properties and large enough to eliminate high surface luminance.

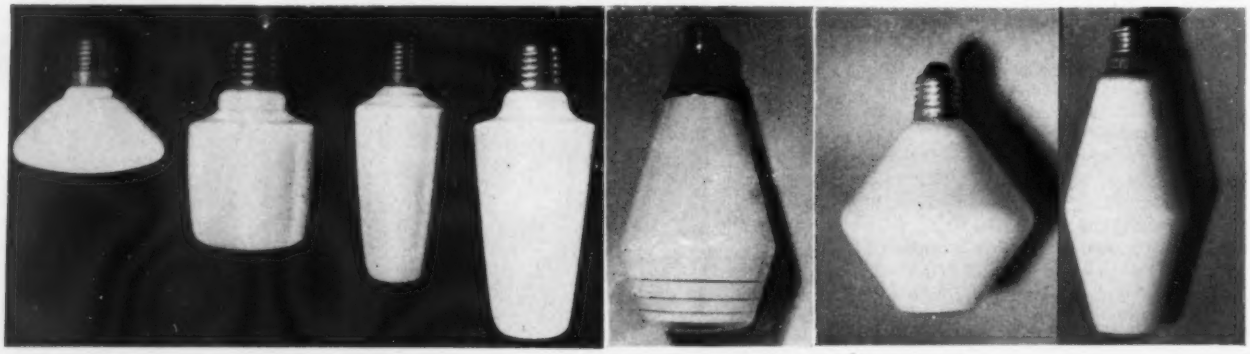
The Finnish development comprises two lamps of 40 W and 60 W rating, with bulbs of double-conical shape, the design having been originated by the artist Tapio Wirkkala. The inner surface of the bulb is coated with a layer of fine white powder which imparts diffusion whilst maintaining a light transmission better than that of opal glass. The base of the lamp is left clear. Lamps are gas filled and stated to have a life of 1,500 hours. They are made by Airam and are to be shown at a number of international exhibitions this year including the Triennale at Milan. The lamp cap is edison screw and, as shown in the illustration, the lampholder has been mounted in a styled cylinder to enhance the overall appearance.



Decorative patterns which can be obtained using the new tungsten lamps developed in Finland. The picture on the right also illustrates the metal sleeve which is used to house the lampholder.

In America, a similar lamp has been developed by General Electric and named the 'Celeste'. Intended primarily for domestic use, it has the same modern do ble-cone style, with a further decoration at its lower end, as well as a clear base, whilst the diffusing finish is available in both white and 'dawn pink'. The lamp is so far made in one size, of 75 W, and is stated to have a life, in normal household use, of three to five years. It may be inserted into existing e.s. lampholders. Suggested uses include bedrooms, hallways, breakfast rooms and kitchens, and in wall outlets for mirror lighting or decorative purposes. Its retail price is expected to be about $2.50 (about £1).

From Germany, four such lamps are noted, these being somewhat rounder in shape than those reported from Finland and the U.S.A. Designed by Professor Wagenfeld, they were shown at the Hanover Fair. The bulbs are of opal glass and sizes range from 25 W to 60 W. Their use is primarily domestic, being employed in various ways as for small glassware fittings.



On the left are seen the four new decorative tungsten lamps developed in Germany. The decorative style is to be contrasted with General Electric's 'Celeste' lamp from America (centre) and the two designs from Finland (right).

MISCELLANY

Situations

Vacant

Troughton and Young (Lighting) Ltd have a vacancy for an ASSISTANT LIGHTING ENGINEER with some experience in the planning of commercial lighting installations. Ability to deal with customers at all levels. Age 24/28. Full details to Technical Director, 143 Knightsbridge, London, SW1.

LIGHTING ENGINEER required in the Birmingham area to promote the sale of commercial and industrial electric light fittings for expanding company. Should have a good connection and considerable experience in selling lighting equipment at all levels, in addition to technical ability. Competence to design lighting installations essential. Age about 25/30. Attractive remuneration, superannuation and suitable car are offered. Apply to Harris and Sheldon (Electrical) Ltd, Birmingham 4.

Personal

THE ELECTRIC LAMP INDUSTRY COUNCIL announces that Mr C. J. W. Scott of Crompton Parkinson Ltd has been elected chairman for the current year, which commenced on July 1. Mr Scott has served on many committees concerned with electric lamps and is a member of the Council of Management of the British Lighting Council.

NEW CHAIRMAN of the Association of Supervising Electrical Engineers is Mr G. G. Kitchener, who succeeds Mr C. G. Aldridge. Mr Kitchener is a technical director of the contracting firm of F. H. Wheeler and Co Ltd, which position he has held since 1956, having joined the firm in 1932. In the Association, he has served on their Executive Council since 1953 and has also held a leading position in the exhibition organization.

FORMERLY WITH an electrical manufacturing concern for a number of years, Mr G. E. More has joined the South East Region of Philips Electrical Ltd as lamp and lighting representative for Kent. He takes over the territory formerly covered by J. P. Skehens, who has been transferred to the Regional Streetlighting Department.

NEW MANAGER OF AEI Lamp and Lighting Co's Southern Region is Mr E. V. Bowers, previously deputy manager of the region, to which post he was appointed in 1956 having been earlier managing director of BTH Sound Equipments Ltd. He succeeds Mr E. J. Melville who is transferred to headquarters staff where he will negotiate nationally with certain customers in conjunction with regional managers. Mr Bowers' offices will be at 132/135 Long Acre, WC2.

MR J. E. TONGE has been appointed technical director of Courtney, Pope (Electrical) Ltd. Mr Tonge controls the firm's Manchester office.

Industrial Notes

BENJAMIN LIGHTING FITTINGS are to be produced in Australia, resulting from an amalgamation of The Benjamin Electric Ltd with the Sydney firm, Bradley's Electrical Industries Pty Ltd. The new firm, formed on July 1, is The Benjamin-Bradley Electric (Pty) Ltd, with works and offices at 145 Parramatta Rd, Five Dock, Sydney, NSW. Benjamin-Bradley are to produce and market Benjamin's standard ranges of tungsten and mercury discharge fittings, including those for MBF lamps and floodlighting lanterns; all future enquiries for Benjamin equipment in Australia should be directed to them.

DSIR IS ORGANIZING a conference on 'Ergonomics in Industry', to be held at the Connaught Rooms, Gt Queen St, W.C.2., from September 27 to 29, 1960. Ergonomics is the term applied to study devoted to improving industrial efficiency by designing equipment to ensure that its operation is within the limits of normal people's mental and physical capacities, taking into account the effects on performance of the complexity of the job and of such environmental conditions as lighting, noise and temperature. It involves the varied application of anatomy, physiology, experimental psychology and other sciences to the problems of fitting the job to the worker. The conference is being organized in seven sessions, dealing with: What ergonomics means; Place of Ergonomics in industry; Ergonomics and production; Ergonomics in the post office; Ergonomics in the steel industry; Ergonomics and products; The future of ergonomics. Applications are being handled by Miss H. M. Clay, DSIR, 14-18 Cornwall Terrace, NW1.

TRADE ASSOCIATIONS, in these days of the Restrictive Practices Act, Monopolies Commission and the like, must perforce become their own apologists. For the Electrical wholesaling business, there is the added difficulty of defending wholesaling in a world where manufacturers are tending more and more to deal directly with retailers and bulk purchasers. A spirited defence of electrical wholesaling has just been made by the Electrical Wholesalers Federation in a booklet which sets out to describe, in simple terms, the electrical wholesaler and the part he plays in the trading community. The argument throughout is that wholesaling assists the manufacturer by bulk purchasing, which stabilises production and by large-scale stockholding and distributing, which can be done more cheaply than by individual manufacturers. It assists contractors and retailers by offering, at one point, a wide variety of products backed up by efficient service and credit facilities.

Trade Literature

LUMITRON LTD, 180 Shaftesbury Avenue, WC2. This firm's suspended luminous ceiling is comprehensively described in a new catalogue. Apart from usual pictures of installations, there are helpful detailed drawings with full technical description. Another new catalogue details their range of Italian fluorescent fittings.

KNIGHTSHADES LTD, Silverhill Works, Theaklin Drive, St Leonards-on-Sea, Sussex. New catalogue setting out their range of fittings being offered for the coming lighting season.

COURTNEY, POPE (ELECTRICAL) LTD, Amhurst Park Works, Tottenham, N15. Broad sheet illustrating their latest designs of decorative tungsten and fluorescent fittings for home lighting.

INSLEY (LONDON) LTD, 21/22 Poland St, W1. Catalogue describing Italian 'Piselli' decorative lighting sets for Christmas tree and similar use.

J. A. WILSON LIGHTING AND DISPLAY INC, 1502 Industrial Drive, Erie, Pennsylvania, USA. Catalogue section describing their 'Capri' luminous ceiling which makes use of 'Paragrid-Tile' louvres.

J. A. CRABTREE AND CO LTD, Lincoln Works, Walsall, Staffs. Adequate wiring at low cost is theme of new booklet 'Design for Living' giving householders guidance on socket-outlet and lighting installations in homes.

ATLAS LIGHTING LTD, Thorn House, 2/4 Upper St Martin's Lane, WC2. New broadsheet describing main ranges of Atlas fluorescent lighting, control gear, suspension sets and accessories.

FREDK THOMAS AND CO LTD, Everton Buildings, Stanhope St, NW1. Catalogue and price list of lighting fittings, glassware available in the firm's range of modern lighting equipment covering general and special-purpose applications.

Postscript

THERE SEEMS TO BE A GROWING RECOGNITION among architects of the fact that it is now technically possible to make artificial lighting so good that some workplaces may best be planned for its permanent use. Even now in some north-light-roofed factories general artificial lighting can be found in use throughout the day. Writing in the recently published *Financial Times Annual Review* 1960, E. D. Jefferiss Mathews, FRIBA, has this to say: "We have the technology which can provide the right light, the right ventilation, the right working temperatures according to the nature of the work, and the right facilities for adaptability. The question is whether this will lead towards the use of natural elements in lighting and ventilation, or artificial ones. Irrespective of the benefits which 'natural things' confer on us, our attempt to control conditions under which we work must lead to a greater use of the artificial counterparts to nature. The 'glass-walled' factory may well be a thing of the past. The attempt to use natural light from the roof with all the problems of condensation, heat gain and loss, the running of service pipes and conduits seems out of date. Look at the amount of artificial light 'burning' in any north-light-roofed factory on any normal day! The trend may well be towards the totally artificially lit factory, although the extent of natural to artificial ventilation will depend on the nature of the industry. In this way environment at the work bench, or on the production line, can be ideal, which is surely what should be obtained—provided always that environment at times of relaxation, the tea-break, the canteen, the social life—is the opposite, and makes full use of what is given us by nature. We are entering the 1960s with materials and techniques from which can come big improvements for those who work in office or factory and, with their proper use from skilled design, they can make a big contribution towards the economics of capital investment in commerce and industry. But to achieve this the watchword must be 'time'—sufficient time to study and think ahead before building."

THE VIEW THAT WE HAVE the technology to provide artificial lighting as acceptable as good daylighting was also expressed in a paper on 'Lighting and Health' read at a recent meeting of the Royal Society of Health. In the July issue of *The Practitioner* there is also an article which points out that vision can be made as good in artificial as in natural lighting, and that it is impracticable to design buildings so that the level of daylight illumination in them is as high as it should be for some practical tasks, except close to windows and only for part of the working day. Fluorescent lamps are among the most important resources of the lighting engineer which enable such satisfactory artificial lighting to be designed. But, among those who don't understand it, there are still misconceptions about the effects of fluorescent lighting. So, it is just as well that *The Practitioner* article deals with the nature of this form of lighting and makes it clear that it is inherently harmless. This assurance to the medical readers of *The Practitioner* is perhaps timely, since the 'announcements' section of the journal includes an advertisement headed 'Sight' which insinuates that 'the increasing use of high intensities everywhere, and of fluorescent lighting with its ultra-violet radiation' is having a destructive effect upon sight.

UNFORTUNATELY, FLUORESCENT LIGHTING has come into the bad news lately for misapplication. At the end of March a disastrous fire occurred in a Glasgow bonded warehouse stocked with whisky, and nineteen gallant men of the fire fighting service lost their lives. At the end of June an inquiry into these deaths was held and the fire prevention officer of Glasgow Fire Brigade said he was 'quite shocked' to find that fluorescent lights had been used in the bond, although it was 'quite impossible' to say that fluorescent lighting caused the fire. Nevertheless, he considered that vapour-proof fittings should be used in whisky warehouses. It should be added that if this is so the requirement applies to tungsten lighting also.

SOME OF THE DECEPTIVE SHADOWS reported to exist on M1 are attributed to the bridges crossing the motorway and a suggestion has been made that subdued lighting under the bridges might remove the hazard. This is questionable. There may be, of course, deceptive shadows on all unlighted roads and it behoves all of us when driving on such roads to drive with the care that the prevailing obscurity ought to suggest to reasonable people. The trouble is that M1 is built for relatively safe fast travelling in daylight but at night, under very different conditions of light, the difficulty of interpreting what is seen—especially if we have no idea what we ought to see—is no less than it is on any other road, and speeds need to be regulated accordingly. It may be that before we get many motorways it will be decided that they ought to be lighted at night.

THAT VALUABLE AND ALWAYS INSTRUCTIVE journal *The Optician* is publishing a series of articles entitled 'Words about Words' in which terms commonly used by opticians are examined etymologically. A few weeks ago the word 'illumination' came under the etymologist's 'microscope'. 'This is a word', says the writer, 'which has acquired increased optical significance during recent years'. And his concluding sentence reads, 'Nowadays, of course, it is commonly applied to the light emanating from artificial sources'. What, then, is the term commonly applied to the light emanating from natural sources? And does the subject of 'Illumination', in which student opticians are examined, cover only artificial light? No reference is made to the CIE and the BSI definition of 'illumination' which, of course, is quite different from the meaning of the word as commonly used. However, the writer in *The Optician* can hardly be taken to task when those most directly concerned with 'illumination' persist in using the word both as a technical term having a rigorously defined meaning and as a synonym for 'lighting'. The absurdity of this is nowhere more apparent than in the title of BS 233, 'Glossary of Terms used in Illumination and Photometry' when one reads the definition of the term 'Illumination' (No. 105) given in the Standard.

'Lumeritas'

G.E.C. post top lanterns

give Birmingham's Inner Ring Road a new high standard of illumination

Lighting-up time in Birmingham will see a new standard of after dark safety on the city's 3¾ mile long 110 ft. wide dual carriageway ring road, already partly constructed.

An overall light intensity of at least 30,000 lumens was specified for the new road, this from lanterns spaced at 100 ft. intervals on the outer kerbs. To achieve this, Sir Herbert J. Manzoni, C.B.E., the City Engineer and Surveyor, called in the G.E.C. Lighting Division to develop his design for a new type of post-top lantern housing three 400w colour corrected mercury lamps.

This is the kind of combined operation the G.E.C. Lighting Division welcomes. It challenges its experience, advances still further its knowledge and makes another British road safe after lighting-up time.

The specially designed post-top lanterns are 4 ft. 6 ins. in diameter, approximately 18 ins. deep, and consist of a domed canopy and dished translucent Perspex bowl. Access to the three Osram 400w colour corrected mercury lamps is remarkably simple. The 30 ft. high slender steel poles are made by Stewarts & Lloyds.

G.E.C.
LIGHTING DIVISION

THE GENERAL ELECTRIC CO. LTD., MAGNET HOUSE, KINGSWAY, LONDON, W.C.2

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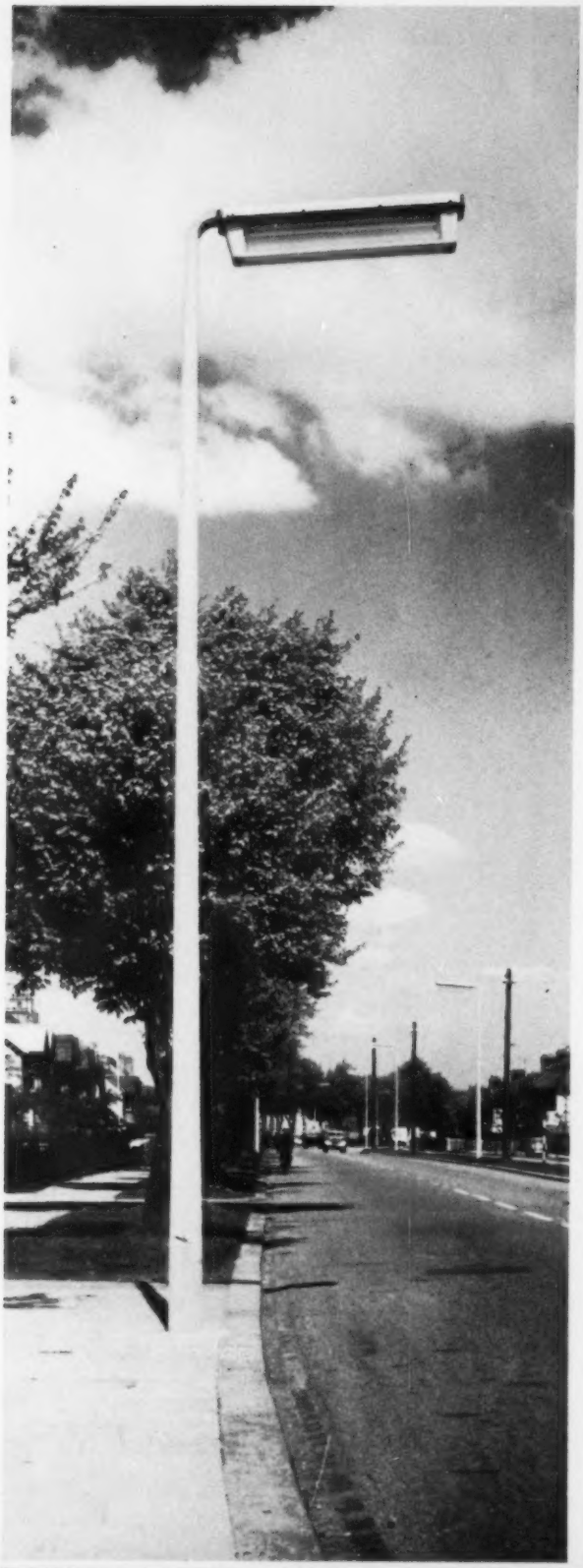


STANTON

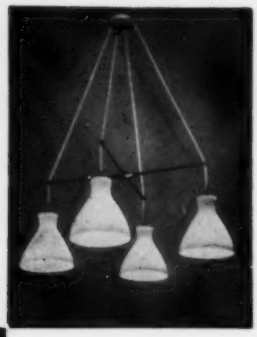
Prestressed Spun Concrete Lighting Columns

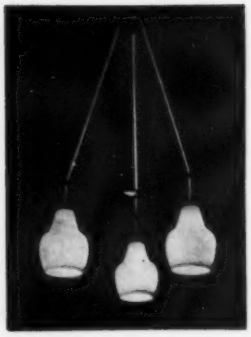
Stanton Type 8K/1 Spun Concrete Lighting Columns fitted with G.E.C. Z.8484 Fluorescent Lanterns at Bedford.

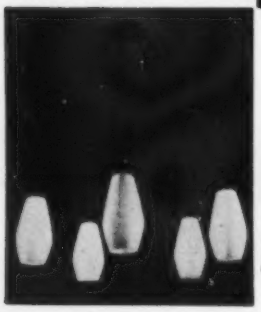
Photograph by courtesy of F. W. Dawkes, Esq., B.Sc. (Eng.), A.M.I.C.E., M.I.Mun.E., A.M.T.P.I., Borough Engineer & Surveyor.

The type shown is one of many Stanton designs approved by the Council of Industrial Design and acceptable to the Ministry of Transport for use on trunk roads.

THE STANTON IRONWORKS COMPANY LIMITED NEAR NOTTINGHAM







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